

284 Sheffield Street, Mountainside, New Jersey 07092, Phone: 908 789

8900, Fax: 908 789 8922

### **Prep Standard - Chemical Standard Summary**

Order ID: P4822

Test: Mercury, Metals ICP-TAL

**Prepbatch ID:** PB164935,PB164947,

Sequence ID/Qc Batch ID: LB133424,LB133457,

### Standard ID:

MP73080,MP83078,MP83079,MP83081,MP83082,MP83083,MP83084,MP83085,MP83086,MP83087,MP83088,MP83091,MP83092,MP83122,MP83208,MP83210,MP83231,MP83232,MP83233,MP83234,MP83235,MP83236,MP83237,MP83238,MP83239,MP83240,MP83241,MP83242,MP83243,MP83245,

### Chemical ID:

M4371, M4583, M4916, M5062, M5130, M5192, M5218, M5223, M5288, M5295, M5296, M5390, M5394, M5404, M5429, M5467, M5498, M5515, M5634, M5658, M5697, M5698, M5747, M5748, M5769, M5798, M5799, M5800, M5801, M5802, M5806, M5814, M5815, M5816, M5817, M5818, M5819, M5820, M5875, M5882, M5884, M5953, M5962, M5970, M5978, M5982, M5984, M5984, M5982, M5984, M5982, M5984, M5982, M5984, M5982, M6000, M6009, M60021, M6023, M6028, M6030, M6033, M6111, M6116, M6117, M6118, M6120, M6121, W2606, W3112, M5820, M5982, M5984, M5982, M5982





### Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
903	ICP AES RINSE SOLN	MP73080	12/27/2022	01/08/2023	Bin He	None	METALS_PIP ETTE_3 (A)	•

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
902	ICP AES CAL BLK ( SO/ICB/CCB)	MP83078	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

FROM 125.00000ml of M6111 + 2350.00000ml of W3112 + 25.00000ml of M6117 = Final Quantity: 2500.000 ml



**FROM** 

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### Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
907	ICP AES STD S ( S5 )	MP83079	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

5.00000ml of M5296 + 5.00000ml of M5394 + 5.00000ml of M5802 + 5.00000ml of M5816 + 5.00000ml of M5820 + 5.00000ml of M5875 + 5.00000ml of M5970 + 5.00000ml of M5982 + 460.0000ml of MP83078 = Final Quantity: 500.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
909	ICP AES STD S3	MP83081	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

**FROM** 25.00000ml of MP83079 + 75.00000ml of MP83078 = Final Quantity: 100.000 ml



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### Metals STANDARD PREPARATION LOG

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3913	ICP AES STD S2	MP83082	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

FROM 16.00000ml of MP83079 + 184.00000ml of MP83078 = Final Quantity: 200.000 ml

Reci	oe NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipettelD	Supervised By
295	ICP AES S1/CRI STOCK STD	MP83083	11/06/2024	12/06/2024	Kareem Khairalla	None	None	Sarabjit Jaswal 11/07/2024

### **FROM**

0.03000 ml of M5798 + 0.03000 ml of M6028 + 0.05000 ml of M5515 + 0.05000 ml of M5658 + 0.05000 ml of M6030 + 0.05000 ml of M6030 + 0.05000 ml of M6030 + 0.05000 ml of M5697 + 0.10000 ml of M5698 + 0.10000 ml of M5801 + 0.10000 ml of M5820 + 0.10000 ml of M5962 + 0.10000 ml of M5970 + 0.10000 ml of M5982 + 0.15000 ml of M5800 + 0.20000 ml of M5748 + 0.20000 ml of M5799 + 0.20000 ml of M5819 + 0.20000 ml of M6021 + 0.20000 ml of M6023 + 0.25000 ml of M5467 + 0.25000 ml of M5802 + 0.50000 ml of M5390 + 0.50000 ml of M5814 + 1.00000 ml of M5992 + 1.00000 ml of M5808 + 1.00000 ml of M5806 + 1.00000 ml of M5816 + 2.00000 ml of M5818 + 77.68000 ml of M58078 = Final Quantity: 100.000 ml



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Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2951	ICP AES S1/CRI WORK STD	MP83084	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

**FROM** 2.00000ml of MP83083 + 98.00000ml of MP83078 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
912	ICP AES ICV SOLN	MP83085	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

FROM 0.02500ml of M5429 + 0.02500ml of M5815 + 0.02500ml of M5817 + 0.25000ml of M5218 + 0.25000ml of M5982 + 10.00000ml of M5295 + 89.77500ml of MP83078 = Final Quantity: 100.000 ml



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### Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
904	ICP AES ICSA SOLN	MP83086	11/06/2024	11/19/2024	Kareem Khairalla	None	None	11/07/2024

**FROM** 25.00000ml of M5130 + 225.00000ml of MP83078 = Final Quantity: 250.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3494	ICP AES ICSAB SOLN-1	MP83087	11/06/2024	11/19/2024	Kareem Khairalla	None	None	11/07/2024

FROM 0.01000ml of M5815 + 0.01000ml of M5817 + 0.10000ml of M5296 + 0.10000ml of M5970 + 1.00000ml of M5982 + 10.00000ml of M5130 + 10.00000ml of M5223 + 79.50000ml of MP83078 = Final Quantity: 100.000 ml





**Metals STANDARD PREPARATION LOG** 

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
911	ICP AES CCV SOLN	MP83088	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

**FROM** 50.00000ml of MP83078 + 50.00000ml of MP83079 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
919	ICP AES INTERNAL STD	MP83091	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

FROM 1.00000ml of M5984 + 10.00000ml of M5985 + 1969.00000ml of W3112 + 20.00000ml of M6117 = Final Quantity: 2000.000 ml





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### Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
513	RINSE SOLN	MP83092	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024

**FROM** 200.00000ml of M6117 + 9800.00000ml of W3112 = Final Quantity: 10000.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
169	1:1HNO3	MP83122	11/07/2024	12/06/2024	Janvi Patel	None	None	11/07/2024

FROM 1000.00000ml of M6116 + 1000.00000ml of W3112 = Final Quantity: 2000.000 ml



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Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
65	POTASSIUM PERMANGANATE SOLUTION 5 %	MP83208	11/11/2024	05/11/2025		METALS_SCA LE_3 (M SC-3)		11/11/2024

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
67	SODIUM CHLORIDE - HYDROXYL- CHLORIDE	MP83210	11/11/2024	05/11/2025		METALS_SCA LE 3 (M SC-3)		11/11/2024
	SOLUTION					( 00 0)		11/11/2024

SOLUTION 2000.0000

2000.00000ml of W3112 + 240.00000gram of M4371 + 240.00000gram of M5884 = Final Quantity: 2000.000 ml



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### **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME_	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
871	MERCURY INTERMEDIATE B 250PPB WORKING STD.	MP83231	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
							A)	

FROM 1.00000ml of M6120 + 2.50000ml of M5062 + 96.50000ml of W3112 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1340	Hg 0.00 PPB STD	MP83232	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP	
							ETTE_5 (HG	11/15/2024

**FROM** 2.50000ml of M6120 + 247.50000ml of W3112 = Final Quantity: 250.000 ml





### **Metals STANDARD PREPARATION LOG**

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
1341	Hg 0.2 PPB STD	MP83233	11/13/2024	11/14/2024	Mohan Bera	None	METALS_PIP ETTE_5 (HG	•
	0.50000   .5140400   .047.00000						<del>' A)</del>	

**FROM** 2.50000ml of M6120 + 247.30000ml of W3112 + 0.20000ml of MP83231 = Final Quantity: 250.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1342	Hg 2.5 PPB STD	MP83234	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP	
							ETTE_5 (HG	11/15/2024
							A)	

FROM 2.50000ml of M6120 + 245.0000ml of W3112 + 2.50000ml of MP83231 = Final Quantity: 250.000 ml





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### **Metals STANDARD PREPARATION LOG**

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal		
1343	Hg 5.0 PPB STD	MP83235	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG			
	A)									

**FROM** 2.50000ml of M6120 + 242.50000ml of W3112 + 5.00000ml of MP83231 = Final Quantity: 250.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1344	Hg 7.5 PPB STD	MP83236	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	•

**FROM** 2.50000ml of M6120 + 240.00000ml of W3112 + 7.50000ml of MP83231 = Final Quantity: 250.000 ml



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### Metals STANDARD PREPARATION LOG

Recipe ID	NAME_	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1345	Hg 10.0 PPB STD	MP83237	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
							A)	

FROM 2.50000ml of M6120 + 237.50000ml of W3112 + 10.00000ml of MP83231 = Final Quantity: 250.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1346	Hg ICV SOLUTION	MP83238	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP	
							ETTE_5 (HG	11/15/2024

**FROM** 2.50000ml of M5953 + 2.50000ml of M6120 + 245.00000ml of W3112 = Final Quantity: 250.000 ml



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### **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1351	ICB (Hg 0.00 PPB SOLUTION)	MP83239	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
							A)	

**FROM** 2.50000ml of M6120 + 247.50000ml of W3112 = Final Quantity: 250.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1358	CCV (Hg 5.0 PPB SOLUTION)	MP83240	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP	
							ETTE_5 (HG	11/15/2024

FROM 485.00000ml of W3112 + 5.00000ml of M6120 + 10.00000ml of MP83231 = Final Quantity: 500.000 ml





### **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1352	CCB (Hg 0.00 PPB SOLUTION)	MP83241	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
							A)	

**FROM** 495.00000ml of W3112 + 5.00000ml of M6120 = Final Quantity: 500.000 ml

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
1349	CRA/CRI (Hg 0.2 PPB SOLUTION)	MP83242	11/13/2024	11/14/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	

FROM 2.50000ml of M6120 + 247.30000ml of W3112 + 0.20000ml of MP83231 = Final Quantity: 250.000 ml



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### **Metals STANDARD PREPARATION LOG**

1350 CHK STD (Hg 7.0 PPB SOLUTION) MP83243 11/13/2024 11/14/2024 Mohan Bera None METALS_PIP ETTE_5 (HG 11/15/2024	<u> </u>	Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
		1350	, 3	MP83243	11/13/2024	11/14/2024	Mohan Bera			

**FROM** 2.50000ml of M6120 + 240.50000ml of W3112 + 7.00000ml of MP83231 = Final Quantity: 250.000 ml

Recipe ID	NAME	NO.	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
68	STANNOUS CHLORIDE SOLUTION	MP83245	11/13/2024	11/14/2024		METALS_SCA LE_3 (M SC-3)		11/15/2024

FROM 450.00000ml of W3112 + 50.00000gram of M5882 + 50.00000ml of M6121 = Final Quantity: 500.000 ml



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-2196-01 / Hydroxylamine Hydrochloride, Crystal (cs/4x500g)	0000215387	06/25/2025	07/01/2019 / RICHARD	06/07/2019 / RICHARD	M4371
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Labpure	0919120 / Boiling Stones	26275770	07/07/2025	07/03/2020 / mohan	05/07/2020 / mohan	M4583
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-3227-05 / Potassium Permanganate (2.5kg)	210800	03/31/2026	11/30/2022 / mohan	07/28/2021 / mohan	M4916
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	MSHG-10PPM / MERCURY HCI 125mL 10ug/mL	S2-HG709270	09/22/2026	05/28/2022 / mohan	01/27/2022 / mohan	M5062
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART A / ICSA (ICP) STOCK SOLN	ICSA-1211	11/19/2024	05/20/2024 /	04/20/2021 / bin	M5130
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
	57042 / Mo, 1000 PPM,	051722	05/17/2025	07/01/2022 /	06/17/2022 /	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CHEM-QC-4 / CHEM-QC-4, Second Source, 1000 ug/ml, B, Mo, Si, Sn, Ti	S2-MEB711674	11/02/2026	07/01/2022 / bin	09/10/2021 / bin	M5218
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSAB (ICP) STOCK SOLN	ICSB-0710	11/19/2024	05/20/2024 /	04/20/2021 / bin	M5223
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58119 / K, 10000 PPM, 500 ml	071122	07/11/2025	09/01/2022 / jaswal	07/21/2022 / jaswal	M5288
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV-1014	02/05/2025	08/07/2024 / jaswal	02/20/2020 / bin	M5295
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	S2-MEB711673	11/02/2026	09/19/2022 / jaswal	08/20/2022 / jaswal	M5296
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute	57056 / Ba, 1000 PPM,	072122	07/21/2025	08/07/2024 /	09/18/2022 /	M5390
Standards, Inc.	125 ml			jaswal	bin	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL	T2-MEB714159	01/13/2027	11/28/2022 / bin	09/19/2022 / bin	M5394
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	22C0462001	06/12/2023	12/20/2022 / Al-Terek	02/11/2022 / Al-Terek	M5404
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57103 / Li, 10000 PPM, 125 ml	070622	07/06/2025	01/30/2023 / bin	01/26/2023 / bin	M5429
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57058 / Cerium, 1000PPM, 100ML	020623	02/06/2026	03/06/2023 / bin	03/01/2023 / bin	M5467
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Supplier  Absolute Standards, Inc.	ItemCode / ItemName  58120 / Ca, 10000 PPM, 500 ml	Lot # 031523	-			
Absolute	58120 / Ca, 10000 PPM,		Date	Opened By 08/15/2023 /	Received By 03/17/2023 /	Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	1403 / Hydrogen Peroxide, 30% 1 gal	820803	02/03/2025	04/18/2024 /	08/03/2022 / Al-Terek	M5634
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58024 / Chromium, Cr, 500 ml, 1000 PPM	060523	06/05/2026	08/28/2023 / jaswal	08/25/2023 / jaswal	M5658
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	102523	10/25/2026	04/03/2024 / jaswal	10/27/2023 / jaswal	M5697
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58025 / Mn, 1000 PPM, 500 ml	102623	10/26/2026	04/18/2024 / jaswal	10/27/2023 / jaswal	M5698
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Lead (Pb) 1000PPM	100923	10/09/2026	05/20/2024 / Jaswal	12/20/2023 / jaswal	M5747
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
	/ Nickel (Ni) 1000PPM	091223	09/12/2026	01/02/2024 /	12/20/2023 /	M5748



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58112 / Mg, 10000 PPM, 500 ml			05/24/2024 / Jaswal	01/03/2024 / bin	M5769
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57004 / Be, 1000 PPM, 125 ml	102523			02/09/2024 / bin	M5798
Supplier	I ItemCode / ItemName   Lot #   '			Received Date / Received By		
Absolute Standards, Inc.	57050 / Sn, 1000 PPM, 125 ml	071123	07/11/2026	02/09/2024 / bin	02/09/2024 / bin	M5799
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	05/31/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Supplier					1	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	122223	12/22/2026	08/01/2024 / Jaswal	01/03/2024 / jaswal	M5806	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57005 / B, 1000 PPM, 125 ml	071123 07/11/2026		03/26/2024 / Sohil	01/03/2024 / jaswal	M5814	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57115 / P, 10000 PPM, 041 125 ml		04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57016 / S, 1000 PPM, 125 ml	122923	12/29/2026	05/20/2024 / Jaswal	02/09/2024 / jaswal	M5816	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #	
Absolute Standards, Inc.	57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #	
Absolute Standards, Inc.	57014 / Si, 1000 PPM, 125 ml	122023	12/20/2026	03/06/2024 / jaswal	02/09/2024 / jaswal	M5818	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	58030 / Zinc, Zn, 500 ml, 1000 PPM	111623	11/16/2026	03/20/2024 / jaswal	02/09/2024 / jaswal	M5819	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57015 / P, 1000 PPM, 125 ml	091123	09/11/2026	05/01/2024 / jaswal	02/09/2024 / jaswal	M5820	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Inorganic Ventures	CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL	T2-MEB714417	01/27/2027	04/19/2024 / jaswal	02/22/2024 / jaswal	M5875	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Seidler Chemical	BA-3980-01 / Stannous Chloride (cs/4x500g)	232820	08/31/2028	04/30/2024 / mohan	04/25/2024 / mohan	M5882	
	Community (community)						
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Supplier Seidler Chemical		Lot # 0000281938	-	-			
	ItemCode / ItemName  BA-3624-05 / Sodium Chloride, Crystal		Date	Opened By 04/30/2024 /	<b>Received By</b> 04/25/2024 /	Lot #	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57003 / Li, 1000 PPM, 125 ml	061224			07/01/2024 / Jaswal	M5970	
Supplier	ItemCode / ItemName	ItemCode / ItemName Lot #		Date Opened / Opened By	Received Date /	Chemtech Lot #	
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	06/17/2027	08/07/2024 / jaswal	02/22/2024 / Jaswal	M5978	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	031524	03/15/2027	07/01/2024 / Jaswal	06/11/2024 / Jaswal	M5982	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #	
Inorganic Ventures	CGY10-1 / YTTRIUM 125mL 10,000ug/mL	V2-Y740548	02/20/2029	08/05/2024 / kareem	06/14/2024 / Jaswal	M5984	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #	
		U2-IN729349	02/21/2028	10/08/2024 /	06/14/2024 /		



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-1 / Laboratory Fortified Stock Solution 1, 125 ml	T2-MEB723367	08/30/2026	08/13/2024 / Jaswal	05/14/2024 / Jaswal	M6000
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-2 / Laboratory Fortified Stock Solution 2, 125 ml	U2-MEB731108			05/14/2024 / Jaswal	M6009
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027 09/28/2024 jaswal		08/05/2024 / Jaswal	M6021
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute	57081 / TI, 1000 PPM, 125	0624724	06/27/2027	08/05/2024 /	08/05/2024 / Jaswal	M6023
Standards, Inc.	ml			kareem	dowal	
Standards, Inc.  Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
		Lot # 070124	I -	Date Opened /	Received Date /	
Supplier  Absolute	ItemCode / ItemName 57048 / Cd, 1000 PPM,		Date	Date Opened / Opened By 08/05/2024 /	Received Date / Received By	Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	58113 / Al, 10000 PPM, 500 ml	011623	01/16/2026	08/07/2024 / Jaswal	01/03/2024 / Jaswal	M6033	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	22F0762009			09/29/2024 / Janvi	M6111	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	•		Chemtech Lot #	
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24B1362001	05/03/2025	11/04/2024 / Janvi	09/29/2024 / Eman	M6116	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Seidler Chemical	BA-9598-34 / Nitric Acid,	24B1362001	05/06/2025	11/06/2024 /	09/29/2024 /	M6117	
Coluici Criciilleai	Instra-Analyzed (cs/4x2.5L)			Janvi	Eman	WOTT	
Supplier	-	Lot #	Expiration Date	Date Opened / Opened By	Eman  Received Date / Received By	Chemtech Lot #	
	Instra-Analyzed (cs/4x2.5L)	Lot # 22E1662006	-	Date Opened /	Received Date /	Chemtech	
Supplier	Instra-Analyzed (cs/4x2.5L)  ItemCode / ItemName  BA-9530-33 / Hydrochloric Acid, Instra-Analyzed		Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	

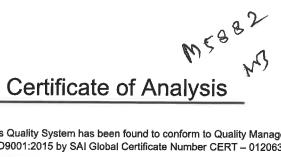


Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	0000275677	05/13/2025	11/13/2024 / Eman	10/13/2024 / Eman	M6121

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	10/24/2024	10/24/2019 / apatel	10/24/2019 / apatel	W2606

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	07/03/2029	07/03/2024 / lwona	07/03/2024 / Iwona	W3112





1 Reagent Lane Fair Lawn, NJ 07410 201,796,7100 tel

Thermo Fisher Scientific's Quality System has been found to conform to Quality Management System

Standard ISO9001:2015 by SAI Global Certificate Number CERT - 0120633 201,796,1329 fax

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Thermo Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Products are for research use or further manufacturing. Not for direct administration to humans or animals. It is the responsibility of the final formulator and end user to determine suitability based upon the intended use of the end product. Products are tested to meet the analytical requirements of the noted grade. The following information is the actual analytical results obtained.

Catalog Number	T142	Quality Test / Release Date	08/17/2023					
Lot Number	232820							
Description	TANNOUS CHLORIDE, DIHYDRATE CERTIFIED ACS (Suitable for Mercury Determination)							
Country of Origin	United States	Suggested Retest Date	Aug/2028					
Chemical Origin	Inorganic-non animal							
BSE/TSE Comment	No animal products are used as sta processing aids, or any other mater	No animal products are used as starting raw material ingredients, or used in processing, including lubricants, processing aids, or any other material that might migrate to the finished product.						

N/A	H. M. C. S. C.		Was I will still
Result Name	Units	Specifications	Test Value
APPEARANCE		REPORT	Clear crystals
ASSAY	%	Inclusive Between 98 - 103	100.65
CALCIUM	%	<= 0.005	0.0017
IDENTIFICATION	PASS/FAIL	= PASS TEST	PASS TEST
IRON (Fe)	%	<= 0.003	0.0011
LEAD (Pb)	%	<= 0.01	0.0006
MERCURY (Hg)	ppm	<= 0.05	<0.05
POTASSIUM (K)	%	<= 0.005	0.0001
SODIUM (Na)	%	<= 0.01	<0.01
SOLUBILITY IN HCL	PASS/FAIL	= PASS TEST	PASS TEST
SULFATE (SO4)	PASS/FAIL	= P.T. (ABOUT 0.003%)	P.T. (ABOUT 0.003%)

Harout Sahagian - Quality Control Supervisor - Fair Lawn

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

R 815/24

Solvent:

24002546

Nitric Acid

Lot #

M6028

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT:

Part Number:

57048 070124

Lot Number: Description:

Cadmium (Cd)

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB

1000

Recommended Storage:

**Expiration Date:** 

070127 Ambient (20 °C)

Weight shown below was dliuted to (mL):

2000.07

0.100 Flask Uncertainty 5E-05 Balance Uncertainty

2%

40.0 (mL) Nitric Acid

Formulated By:

Alban PROBAN

Aleah O'Brady

070124

Reviewed By:

Pedro L. Rentas

070124

Expanded

Weight (g) Conc. (µg/mL) Uncertainty

Cadmium nitrate tetrahydrate (Cd)

IN024 CDM092021A1

1000

99.999

0.10

36.5

5.4797

5.4804

1000.1

2.0

10022-68-1

0.01 mg/m3

orl-rat 60.2mg/kg

3108

RM#

Number Lot

Conc. (µg/mL)

8

8

Weight (g)

Target

Actual

Actual

Nominal

Purity

Uncertainty Assay Purity (%)

+/- (µg/mL)

CAS#

**SDS Information** 

(Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50

**NIST** SRM

m/z-> -z/m m/z-> 1.0E7 2.0E7 5.OE4 1.0E5 2.5E4 5.0M4 [1] Spectrum No.1 010 110 0 220 120 20 [ 12.514 sec]:58148.D# [Count] [Linear] 230 130 30 240 140 40 N00 150 50 2000 160 60 170 70 180 80 061 Ö 200 100

1 of 2

www.absolutestandards.com

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Part # 57048

2 of 2



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CHEM-CLP-4
Lot Number: S2-MEB711673
Matrix: 3% (v/v) HNO3

3% (v/v) HF

Value / Analyte(s): 1 000 μg/mL ea:

Boron, Molybdenum,

Silicon, Tin,

Titanium

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE Boron, B  $1\ 000\pm 6\ \mu g/mL$  Molybdenum, Mo  $1\ 000\pm 6\ \mu g/mL$  Silicon, Si  $1\ 000\pm 7\ \mu g/mL$  Tin, Sn  $1\ 000\pm 6\ \mu g/mL$ 

Titanium, Ti  $1000 \pm 7 \mu g/mL$ 

**Density:** 1.030 g/mL (measured at 20  $\pm$  4 °C)

### **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	110830
Мо	ICP Assay	3134	130418
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	3162a	130925

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods Characterization of CRM/RM by One Method Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are Certified Value, X<sub>CRM/RM</sub>, where one method of characterization used is the weighted mean of the results: is used is the mean of individual results: $X_{CRM/RM} = \Sigma(w_i) (X_i)$ $X_{CRM/RM} = (X_a) (u_{char} a)$ X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub> Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u<sub>char a</sub> = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM}$ = k ( $u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$ )<sup>1/2</sup> CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)\right]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u<sub>char a</sub> = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty u<sub>lts</sub> = long term stability standard uncertainty (storage) u<sub>lts</sub> = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u<sub>ts</sub> = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (μg/mL)

### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit <a href="www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a> **HF Note:** This standard should not be prepared or stored in glass.

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganic ventures.com; info@inorganic ventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

November 02, 2021

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- November 02, 2026

- Sealed TCT Rag Open Date:

- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

		=	
This CDM/DM should not be us	and langer than one year (or civ	months in the case	of a 20 m

- Inis CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

Michael 2 Booth

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Michael Booth Director, Quality Control

### **Certifying Officer:**

Paul Gaines

Chairman / Senior Technical Director

Paul R Saines



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CLPP-CAL-1

Lot Number: T2-MEB714417

Matrix: 5% (v/v) HNO3

Value / Analyte(s): 5 000 µg/mL ea:

Calcium, Potassium, Magnesium, Sodium,

2 000 µg/mL ea:

Aluminum, Barium,

1 000 µg/mL ea:

Iron,

500 μg/mL ea:

Nickel, Vanadium, Zinc, Cobalt,

Manganese, 250 μg/mL ea:

Silver, Copper,

200 μg/mL ea: Chromium, 50 μg/mL ea: Beryllium

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Aluminum, Al	CERTIFIED VALUE 2 000 ± 7 μg/mL	ANALYTE Barium, Ba	CERTIFIED VALUE 2 000 ± 9 μg/mL
Beryllium, Be	50.00 ± 0.26 μg/mL	Calcium, Ca	5 000 ± 22 μg/mL
Chromium, Cr	200.0 ± 1.0 μg/mL	Cobalt, Co	500.0 ± 2.4 μg/mL
Copper, Cu	250.0 ± 1.0 μg/mL	Iron, Fe	1 000 ± 4 μg/mL
Magnesium, Mg	5 000 ± 20 μg/mL	Manganese, Mn	500.0 ± 2.0 μg/mL
Nickel, Ni	500.0 ± 2.2 μg/mL	Potassium, K	5 000 ± 19 μg/mL
Silver, Ag	250.0 ± 1.1 μg/mL	Sodium, Na	5 000 ± 18 μg/mL
Vanadium, V	499.7 ± 2.2 μg/mL	Zinc, Zn	500.0 ± 2.2 μg/mL

**Density:** 1.118 g/mL (measured at  $20 \pm 4$  °C)

### **Assay Information:**

13.	ay iiii Oi iii atioii.			
	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151	160729
	Ag	Volhard	999c	999c
	Al	ICP Assay	3101a	140903
	Al	EDTA	928	928
	Ва	ICP Assay	3104a	140909
	Ва	Gravimetric		See Sec. 4.2
	Ве	ICP Assay	3105a	090514
	Ве	Calculated		See Sec. 4.2
	Ca	ICP Assay	3109a	130213
	Ca	EDTA	928	928
	Co	ICP Assay	3113	190630
	Co	EDTA	928	928
	Cr	ICP Assay	3112a	170630
	Cr	Calculated		See Sec. 4.2
	Cu	ICP Assay	3114	121207
	Cu	EDTA	928	928
	Fe	ICP Assay	3126a	140812
	Fe	EDTA	928	928
	K	ICP Assay	3141a	140813
	K	Gravimetric		See Sec. 4.2
	Mg	ICP Assay	3131a	140110
	Mg	EDTA	928	928
	Mn	ICP Assay	3132	050429
	Mn	EDTA	928	928
	Na	ICP Assay	3152a	120715
	Na	Gravimetric		See Sec. 4.2
	Ni	ICP Assay	3136	120619
	Ni	EDTA	928	928
	V	IC Assay	3165	160906
	V	EDTA	928	928
	Zn	ICP Assay	3168a	120629
	Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods Characterization of CRM/RM by One Method Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are Certified Value, X<sub>CRM/RM</sub>, where one method of characterization used is the weighted mean of the results: is used is the mean of individual results: $X_{CRM/RM} = \Sigma(w_i) (X_i)$ $X_{CRM/RM} = (X_a) (u_{char} a)$ X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub> Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u<sub>char a</sub> = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{\frac{1}{2}}$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = [\Sigma((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u<sub>char a</sub> = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty ults = long term stability standard uncertainty (storage) u<sub>lts</sub> = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u<sub>ts</sub> = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

 An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (μg/mL)

### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit <a href="https://www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a>

Note: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information.

https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganic ventures.com; info@inorganic ventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

January 27, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- January 27, 2027
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

<ul> <li>Sealed TCT Bag Open Date:</li> </ul>	
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- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### **Certificate Approved By:**

Thomas Kozikowski Manager, Quality Control

### **Certifying Officer:**

Paul Gaines

Chairman / Senior Technical Director

20178Ci



# Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

CLPP-CAL-3 Catalog Number: T2-MEB714159 Lot Number: Matrix: 7% (v/v) HNO3 Value / Analyte(s):

> Arsenic, Lead, Selenium, Thallium,

500 µg/mL ea: Cadmium

1 000 µg/mL ea:

### 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

**ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE** 1 000 ± 8 µg/mL Cadmium, Cd  $500.0 \pm 2.1 \,\mu g/mL$ Arsenic, As Lead, Pb 1 000 ± 5 µg/mL Selenium, Se 1 000 ± 8 µg/mL

Thallium, TI 1 000 ± 7 µg/mL

Density: 1.043 g/mL (measured at 20  $\pm$  4 °C)

### **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
As	ICP Assay	3103a	100818
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
TI	ICP Assay	3158	151215

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods Characterization of CRM/RM by One Method Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are Certified Value, X<sub>CRM/RM</sub>, where one method of characterization used is the weighted mean of the results: is used is the mean of individual results: $X_{CRM/RM} = \Sigma(w_i) (X_i)$ $X_{CRM/RM} = (X_a) (u_{char} a)$ X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub> Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u<sub>char a</sub> = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)\right]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u<sub>char a</sub> = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty ults = long term stability standard uncertainty (storage) u<sub>lts</sub> = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u<sub>ts</sub> = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

 An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

# 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (μg/mL)

### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

### 8.0 HAZARDOUS INFORMATION

Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganic ventures.com; info@inorganic ventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

January 13, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- January 13, 2027
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

Sealed TCT Bag Open Date:	
· Sealeo TCT Bao Oberi Dale	

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### **Certificate Approved By:**

Thomas Kozikowski Manager, Quality Control

### **Certifying Officer:**

Paul Gaines

Chairman / Senior Technical Director

20178Ci

### M6000,M6001,M6002,M6003,M6004,M6005,M6006,M6007,M6008



# Certificate of Analysis

Refine your results. Redefine your industry. RD:05/14/2024

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

**Product Code:** 

Multi Analyte Custom Grade Solution

Catalog Number:

WW-LFS-1

Lot Number:

T2-MEB723367

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

1 000 μg/mL ea: Potassium, 600 μg/mL ea: Phosphorus, 300 μg/mL ea:

Iron,

200 μg/mL ea:

Sodium,

Magnesium, Aluminum, Cerium, Selenium,

Thallium,

100 μg/mL ea:

Lead, Calcium,

80 µg/mL ea: Arsenic, 70 µg/mL ea: Mercury, 50 µg/mL ea: Nickel,

40 μg/mL ea: Chromium,

30 μg/mL ea:

Copper, Boron,

Vanadium,

20 μg/mL ea:

Zinc, Strontium,
Barium, Beryllium,
Cadmium, Cobalt,
Manganese, Lithium,

7.5 µg/mL ea: Silver

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Aluminum, Al	CERTIFIED VALUE 200.0 ± 0.7 µg/mL	ANALYTE Arsenic, As	CERTIFIED VALUE 80.0 ± 0.7 µg/mL
Barium, Ba	20.00 ± 0.09 μg/mL	Beryllium, Be	20.00 ± 0.13 μg/mL
Boron, B	30.00 ± 0.18 μg/mL	Cadmlum, Cd	20.00 ± 0.09 μg/mL
Calcium, Ca	100.0 ± 0.4 μg/mL	Cerium, Ce	200.0 ± 0.8 µg/mL
Chromium, Cr	40.00 ± 0.30 μg/mL	Cobalt, Co	20.00 ± 0.10 μg/mL
Copper, Cu	30.00 ± 0.13 μg/mL	Iron, Fe	300.0 ± 1.3 μg/mL
Lead, Pb	100.0 ± 0.4 μg/mL	Lithium, Li	20.00 ± 0.08 µg/mL
Magneslum, Mg	200.0 ± 0.8 μg/mL	Manganese, Mn	20.00 ± 0.08 µg/mL
Mercury, Hg	70.0 ± 0.3 µg/mL	Nickel, Ni	50.00 ± 0.22 μg/mL
Phosphorus, P	600.0 ± 2.7 μg/mL	Potassium, K	1 000 ± 4 µg/mL
Selenium, Se	200.0 ± 1.3 μg/mL	Silver, Ag	7.50 ± 0.03 µg/mL
Sodium, Na	300.0 ± 1.4 μg/mL	Strontium, Sr	20.01 ± 0.08 μg/mL
Thailium, Ti	200.0 ± 1.4 μg/mL	Vanadium, V	30.00 ± 0.13 μg/mL
Zinc, Zn	20.00 ± 0.09 μg/mL		

1.034 g/mL (measured at 20  $\pm$  4 °C) Density:

**Assay Information:** 

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	160729
Ag	Volhard	999c	999c
Ag	Calculated		See Sec. 4.2
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
В	ICP Assay	3107	190605
Ва	ICP Assay	3104a	140909
Ва	Gravimetric		See Sec. 4.2
Ве	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Ce	ICP Assay	3110	090504
Ce	EDTA	928	928
Co	ICP Assay	3113	190630
Со	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	Traceable to 3152A	S2-NA700842
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Sr	EDTA	928	928
Sr	ICP Assay	Traceable to 3153a	K2-SR650985
TI	ICP Assay	3158	151215
V	IC Assay	3165	160906
V	EDTA	928	928
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

Page 4 of 6

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

 $X_i$  = mean of Assay Method i with standard uncertainty  $u_{char\ i}$ 

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

 $w_i = (1/u_{char})^2 / (\Sigma(1/(u_{char})^2))$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left\{ u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts} \right\}^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/2}$  where  $u_{char}$  is are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRMRM</sub>, where one method of characterization is used is the mean of individual results:

 $X_{CRM/RM} = (X_a) (u_{char})$ 

X<sub>g</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{chara} + u^2_{bb} + u^2_{tts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

uchar a = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (slorage) u<sub>ts</sub> = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

### 8.0 HAZARDOUS INFORMATION

Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

August 30, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- August 30, 2026
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRMRM can be supported by long term stability studies conducted on properly stored and handled CRMRMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

<ul> <li>Sealed TCT Bag Open Date</li> </ul>	
--	--

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### **Certificate Approved By:**

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

**Paul Gaines** 

Chairman / Senior Technical Director

DD978hi.



# Certificate of Analysis

Refine your results. Redefine your industry. RD:05/14/2024

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 **ACCREDITATION / REGISTRATION**

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

**Product Code:** 

Multi Analyte Custom Grade Solution

Catalog Number:

WW-LFS-2

Lot Number:

U2-MEB731108

Matrix:

5% (v/v) HNO3

tr. HF

Value / Analyte(s):

200 µg/mL ea:

Silica,

80 µg/mL ea: Antimony, 70 µg/mL ea:

Tin,

40 µg/mL ea: Molybdenum, 20 µg/mL ea:

### 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

**ANALYTE** Antimony, Sb **CERTIFIED VALUE** 80.1 ± 0.6 µg/mL

Titanium

**ANALYTE** Molybdenum, Mo **CERTIFIED VALUE** 40.03 ± 0.18 µg/mL

Silica, SIQ2

200.2 ± 1.3 μg/mL

Tin, Sn

 $70.0 \pm 0.4 \, \mu g/mL$ 

Titanium, Ti

20.01 ± 0.13 µg/mL

Density:

1.025 g/mL (measured at 20 ± 4 °C)

### **Assay Information:**

ANALYTE Mo	METHOD ICP Assav	NIST SRM# 3134	SRM LOT# 130418
Мо	Calculated		See Sec. 4.2
Sb	ICP Assay	3102a	140911
SiO2	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
П	ICP Assay	3162a	130925
Ti	Calculated		See Sec. 4.2

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

 $\mathbf{w_j}$  = the weighting factors for each method calculated using the inverse square of the variance:

 $w_i = (1/u_{char i})^2 / (\Sigma (1/(u_{char i})^2))$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} \simeq k \left\{ u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts} \right\}^{\frac{1}{2}}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$  where  $u_{char}$  are the errors from each characterization method

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of Individual results:

 $X_{CRM/RM} = (X_a) (u_{char e})$ 

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{bs} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

 $u_{char}$  a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/Δ

### 6.0 INTENDED USE

- 6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- **6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale.</u>
  <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.Inorganicventures.com/TCT HF Note: This standard should not be prepared or stored in glass.

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous.
 Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

March 17, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- March 17, 2028
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

<ul> <li>Sealed TCT Bag Open Date</li> </ul>	
--	--

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control 3D978hi.

**Certifying Officer:** 

Paul Gaines
Chairman / Senior Technical I

Chairman / Senior Technical Director

M4371

Hydroxylamine Hydrochloride, Crystal BAKER ANALYZED® A.C.S. Reagent

Suitable for Mercury Determination (hydroxylammonium chloride)

Rec - 06.07.12





Material No.: 2196-01

Batch No.: 0000215387

Manufactured Date: 2018/06/27 Retest Date: 2025/06/25

Revision No: 1

## Certificate of Analysis

Meets ACS Reagent Chemical Requirements,

Specification	Result
>= 96.0 %	99.1
Passes Test	PT
<= 0.050 %	0.017
<= 0.25	0.19
Passes Test	PT
<= 0.005 %	< 0.003
<= 5 ppm	4
<= 5 ppm	< 3
<= 0.050 ppm	< 0.005
	>= 96.0 % Passes Test <= 0.050 % <= 0.25 Passes Test <= 0.005 % <= 5 ppm <= 5 ppm

For Laboratory, Research or Manufacturing Use

Country of Origin:

CN

Packaging Site:

Paris Mfg Ctr & DC



Phillipsburg, NJ 9001:2015, FSSC22000
Paris, KY 9001:2008
Mexico City, Mexico 9001:2008
Gliwice, Poland 9001:2015, 13485:2012
Selangor, Malaysia 9001:2008
Dehradun, India, 9001:2008, 14001:2004, 13485:2003
Mumbai, India, 9001:2015, 17025:2005
Panoli, India 9001:2015

Jamie Ethier
Vice President Global Quality

WAZY DX.



### Manufacturer:

Saint-Gobain Performance Plastics 11 Sicho Drive Poestenkill, NY 12140

### **Certificate of Conformance**

Part Number		Customer Part Number/ Revision:	1069103 N/A
Description:	*PTFE BOILING STONES-450 GRAMS		
Lot Number:	26275770	Lot Quantity:	10 EA
Date of Manufacture (MM/DD/YY)	03/23/20	Expiration Date: (MM/DD/YY)	N/A
(Refer to th	Post Processing Run Number: ne attached Certificate for Additional Detail)		N/A

# We certify the material listed above confirms in full with the following specifications:

All items have been manufactured, inspected, tested, and accepted in accordance with our Quality Management system, ISO 9001-2015. Documentation substantiating this certification is kept on record per the Company's retention policy and is available for review.

All materials and processes used in manufacturing conform to the materials and/or manufacturing specifications and notes indicated on the purchase order, drawing, specifications, quality assurance requirements, or other applicable documents effective on the date of manufacture.

Saint-Gobain does not warrant the product for any particular application and it is the responsibility of the user to conduct tests that are deemed necessary to determine the suitability of the product for any particular use. Saint-Gobain's sole responsibility shall be for failure to manufacture the product in accordance with specifications and requirements of the buyer, and from defects in material and workmanship. This warranty is expressly made in lieu of any and all other warranties and Saint-Gobain's sole liability shall be to replace any product not in conformance with the specification and requirements of the buyer.

Quality Approval:	goodla Kondla	Date:	05/13/20	
	,			



M4913- 16



## Certificate of Analysis

1 Reagent Lane Fair Lawn, NJ 07410 201.796.7100 tel 201.796.1329 fax

Thermo Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2015 by SAI Global Certificate Number CERT – 0120632

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Thermo Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Products are for research use or further manufacturing. Not for direct administration to humans or animals. It is the responsibility of the final formulator and end user to determine suitability based upon the intended use of the end product. Products are tested to meet the analytical requirements of the noted grade. The following information is the actual analytical results obtained.

Catalog Number	P279	Quality Test / Release Date	01/12/2021
Lot Number	210306		
Description	POTASSIUM PERMANGANATE, A.C.S.	The second secon	
Country of Origin	United States	Suggested Retest Date	Jan/2026

N/A							
Result Name	Units	Specifications	Test Value				
APPEARANCE		REPORT	Dark purple to purple green crystals				
ASSAY	%	>= 99	99.3				
CHLORIDE & CHLORATE	%	<= 0.005	<0.005				
IDENTIFICATION	PASS/FAIL	= PASS TEST	pass test				
INSOLUBLE MATTER	%	<= 0.2	<0.2				
MERCURY (Hg)	ppm	<= 0.05	<0.004				
SULFATE (SO4)	%	<= 0.02	<0.02				

Julian Burton

Julian Burton - Quality Control Manager - Fair Lawn



# Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com M5062 M5063

P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code:

Single Analyte Mass Spec Solution

Catalog Number:

MSHG-10PPM

Lot Number:

S2-HG709270

Matrix:

10% (v/v) HCI

Value / Analyte(s):

10 μg/mL ea:

Mercury

Starting Material:

Hg metal

Starting Material Lot#:

1959

Starting Material Purity:

99.9994%

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 

 $10.001 \pm 0.053 \,\mu g/mL$ 

Density:

1.020 g/mL (measured at 20 ± 4 °C)

### **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
Ha	Calculated		See Sec. 4.2

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

 $X_{CRM/RM} = \Sigma(w_i) (X_i)$ 

 $\mathbf{X_i}$  = mean of Assay Method i with standard uncertainty  $\mathbf{u_{char}}$  i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of

the variance.

 $\mathbf{w_i} = (1/u_{chari})^2 / (\Sigma (1/(u_{chari})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{its}^2 + u_{ts}^2)^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$  where  $u_{char}$  i are the errors from each characterization method

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

Xa = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) = U<sub>CRM/RM</sub> = k (u<sup>2</sup>char a + u<sup>2</sup>bb + u<sup>2</sup>lts + u<sup>2</sup>ts) 1/2

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

```
O Ag
          0.000011 M Eu <
                            0.000201 O Na
                                              0.000004 M Se <
                                                               0.015915 O Zn <
                                                                                 0.001510
0
   Al
          0.000001 O Fe
                            0.000001 M Nb <
                                              0.000201 O Si
                                                                0.000005 M Zr <
                                                                                 0.000201
M
   As <
          0.000402 M Ga <
                            0.000201 M Nd <
                                              0.000201 M Sm <
                                                               0.000201
M
   Au <
          0.003631 M Gd <
                            0.000201 M Ni <
                                              0.000402 M
                                                        Sn <
                                                               0.001007
M
   B <
          0.001208 M
                    Ge <
                            0.000201 M Os <
                                              0.000605 M
                                                        Sr <
                                                               0.000201
M Ba <
          0.000201 M Hf <
                            0.000201 O P <
                                              0.032370 M
                                                        Ta <
                                                               0.000201
M
  Be <
          0.000201 s
                                   M Pb <
                    Hq <
                                              0.000201 M Tb <
                                                               0.000201
M Bi <
          0.000201 M
                    Ho <
                            0.000201 M Pd <
                                              0.000403 M
                                                        Te <
                                                               0.002216
0
  Ca
          0.000007 M In <
                            0.000201 M Pr <
                                              0.000201 M Th <
                                                               0.000201
M
  Cd <
          0.000201 M Ir
                            0.000201 M
                                      Pt <
                                              0.000402 M Ti <
                                                               0.000402
                                              0.000201 O TI <
M
  Ce <
          0.000201 O K
                            0.000020 M
                                      Rb <
                                                               0.016508
  Co <
M
          0.000201 M La <
                            0.000201 M
                                      Re <
                                              0.000201 M Tm <
                                                               0.000201
  Cr <
0
          0.003021 O Li <
                            0.000107 M
                                      Rh <
                                              0.000201 M U <
                                                               0.008058
M
  Cs <
          0.001208 M Lu <
                            0.000201 M Ru <
                                              0.000201 M V <
                                                               0.000201
M
  Cu <
          0.000402 O
                    Mg
                            0.000001 O
                                      S <
                                             0.053950 M W <
                                                               0.000604
M Dy <
          0.000201 M Mn <
                            0.000604 M Sb <
                                             0.001208 M Y <
                                                               0.000201
M Er <
          0.000201 M Mo
                           0.000009 M Sc <
                                             0.000201 M Yb <
                                                               0.000201
```

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference n - Not Checked For s - Solution Standard Element

### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution -** 200.59 +2 4 Hg(OH)(aq) 1+ **Chemical Compatibility -** Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.

**Stability -** 2-100 ppb levels not stable in 1% HNO3 / LDPE container, stable in 10% HNO3 packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO3 packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO3 / LDPE container.

**Hg Containing Samples (Preparation and Solution) -** Metal (soluble in HNO3); Oxide (Soluble in HNO3); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation questions in further detail.).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 202 amu	9 ppt	n/a	186W16O
ICP-OES 184.950 nm	0.03 / 0.005 μg/mL	1	
ICP-OES 194.227 nm	0.03 / 0.005 µg/mL	1	V
ICP-OES 253.652 nm	0.1 / 0.03 µg/mL	1	Ta, Co, Th, Rh, Fe,
			U

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

September 22, 2021

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- September 22, 2026
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

Sealed TCT	Bag	Open Date	:		

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

# 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS Certificate Prepared By:

Uyen Truong
Supervisor, Product Documentation

Mya Truong

### Certificate Approved By:

Michael Booth Director, Quality Control Michael 2 Booth

### Certifying Officer:

Paul Gaines Chairman / Senior Technical Director Paul R Laines





# QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-AES ICS

# QATS LABORATORY INORGANIC REFERENCE MATERIAL INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (ICSA WITH ICSB)

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with the

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".

<u>CAUTION:</u> The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.** 

### (B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

### (C) ANALYSIS OF SAMPLES

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,







# QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

### Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:

**ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSA solution by ICP-AES.

ICSB-0710, Analytes, mixed with ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSAB solution by ICP-AES.

### (D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211,
AND ICSA-1211 MIXED WITH ICSB-0710

Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10.0	10.0	104	88.4	120
Ba	200	(6.0)	-194	206	(537)	337	737
Be	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Со	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
Mg	5000	255000	216000	294000	248000	210000	286000
Mn	15	(7.0)	-8.0	22.0	507	430	584
Ni	40	(2.0)	-38.0	42.0	954	810	1100
Se	35	(0.0)	-35.0	35.0	(46.0)	11.0	81.0
Ag	10	(0.0)	-10.0	10.0	201	170	232
TI	25	(0.0)	-25.0	25.0	(108)	83.0	133
V	50	(0.0)	-50.0	50.0	491	417	565
Zn	60	(0.0)	-60.0	60.0	952	809	1095

ICSA M5126 M5127 M5128 M5129 M5130

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value  $\pm$  1 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value  $\pm$  15 percent of the listed certified value.

value  $\pm$  15 percent of the listed certified value.

**ICSB** 

M5219

M5220

M5221

M5222

M5223

# Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



# Certified Reference Material CRM

M.5192 R: 06/17/2

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Ammonium molybdate (Mo) Compound Nominal Concentration (µg/mL): m/z-> M/z-> Recommended Storage: m/z-> Volume shown below was diluted to (mL): 2.0E6 1.0E6 1.0E5 2.0E5 2000 1000 **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 210 0 58142 Number Part **BTU9** 1000 57042 Ambient (20 °C) 051722 051725 Molybdenum (Mo) 022222 Fot 120 220 20 [ 8.594 sec]:57042.D# [Count] [Linear] 3000.41 0.1000 Factor Dilution 130 230 30 5E-05 300.0 Vol. (mL) 0.058 Initial Flask Uncertainty Balance Uncertainty Pipette (mL) Conc. (µg/mL) Uncertainty 0.084 240 140 40 MKBQ8597V Ammonium hydroxide Nominal Lot # 0.5% 1000 250 150 50 Conc. (µg/mL) 10001.0 Initial (III) 15.0 160 260 60 Conc. (µg/mL) Ammonium hydroxide 1000.0 Final 170 70 Formulated By: Reviewed By: Uncertainty +/- (µg/mL) Expanded 2.1 180 80 13106-76-8 (Solvent Safety Info. On Attached pg.) Lawrence Barry OSHA PEL (TWA) Pedro L. Rentas 5 mg(Mo)/m3 190 90 SDS Information 200 100 orl-rat 333 mg/kg 051722 051722 3134 SRM TSIN

Printed: 6/16/2022, 1:36:08 PM

# Certified Reference Material CRM



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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# Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



# Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CHEM-QC-4

Lot Number: S2-MEB711674

Matrix: 3% (v/v) HNO3
 3% (v/v) HF

3 /0 (V/V) I II

Value / Analyte(s): 1 000 μg/mL ea:

Boron, Molybdenum,

Silicon, Tin,

Titanium

**Second Source**: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE Boron, B  $1\,000\pm7\,\mu\text{g/mL}$  Molybdenum, Mo  $1\,000\pm5\,\mu\text{g/mL}$  Silicon, Si  $1\,000\pm7\,\mu\text{g/mL}$  Tin, Sn  $1\,000\pm5\,\mu\text{g/mL}$ 

Titanium, Ti  $1 001 \pm 6 \mu g/mL$ 

**Density:** 1.032 g/mL (measured at 20  $\pm$  4 °C)

### **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	110830
Мо	ICP Assay	3134	130418
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	3162a	130925

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods Characterization of CRM/RM by One Method Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are Certified Value, X<sub>CRM/RM</sub>, where one method of characterization used is the weighted mean of the results: is used is the mean of individual results: $X_{CRM/RM} = \Sigma(w_i) (X_i)$ $X_{CRM/RM} = (X_a) (u_{char} a)$ X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub> Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u<sub>char a</sub> = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM}$ = k ( $u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$ )<sup>1/2</sup> CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)\right]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u<sub>char a</sub> = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty u<sub>lts</sub> = long term stability standard uncertainty (storage) u<sub>lts</sub> = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u<sub>ts</sub> = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (μg/mL)

### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit <a href="www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a> **HF Note:** This standard should not be prepared or stored in glass.

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganic ventures.com; info@inorganic ventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

November 02, 2021

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- November 02, 2026

- Sealed TCT Rag Open Date:

- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

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This CDM/DM should not be us	and langer than one year (or give	months in the case	of a 20 m

- Inis CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

Michael 2 Booth

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Michael Booth Director, Quality Control

### **Certifying Officer:**

Paul Gaines

Chairman / Senior Technical Director

Paul R Sains





# QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-AES ICS

# QATS LABORATORY INORGANIC REFERENCE MATERIAL INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (ICSA WITH ICSB)

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with the

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".

<u>CAUTION:</u> The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.** 

### (B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

### (C) ANALYSIS OF SAMPLES

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,







# QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

### Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:

**ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSA solution by ICP-AES.

ICSB-0710, Analytes, mixed with ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSAB solution by ICP-AES.

### (D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211,
AND ICSA-1211 MIXED WITH ICSB-0710

Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10.0	10.0	104	88.4	120
Ba	200	(6.0)	-194	206	(537)	337	737
Be	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Со	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
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Ni	40	(2.0)	-38.0	42.0	954	810	1100
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Zn	60	(0.0)	-60.0	60.0	952	809	1095

ICSA M5126 M5127 M5128 M5129 M5130

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value  $\pm$  1 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value  $\pm$  15 percent of the listed certified value.

value  $\pm$  15 percent of the listed certified value.

**ICSB** 

M5219

M5220

M5221

M5222

M5223

3

Certified Reference Material CRM

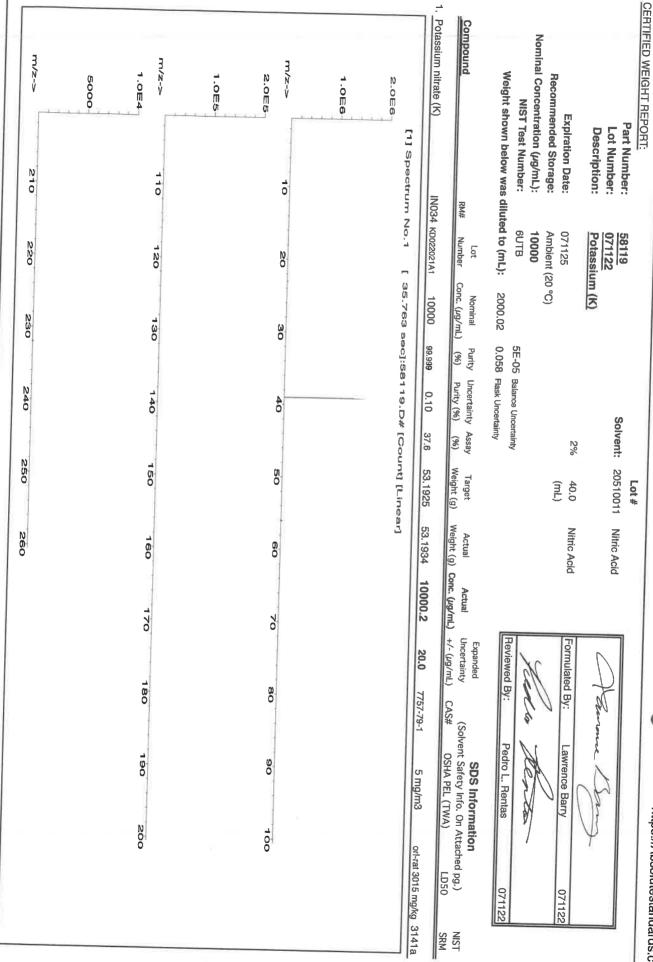
www.absolutestandards.com

800-368-1131

Absolute Standards, Inc.



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Physical Characterization:	Al <0.02 Cd <0.02 Dy Sb <0.02 Ca <0.02 Er As <0.2 Ce <0.02 En Ba <0.02 Cs <0.02 Gd Be <0.01 Cr <0.02 Ga Bi <0.02 Co <0.02 Ga Bi <0.02 Co <0.02 Ga	
23 10,002 43	<0.022         Hf         <0.022         Li         <0.022         Ni         <0.022         Pr         <0.023         Se         <0.22         Tb         <0.022         W         <0.022           <0.022	Trace Metals Verification by ICP-MS (ug/ml)

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

 $^{\star}$  Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All standards should be stored with caps tight and under appropriate laboratory conditions. \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Part # 58119



### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program" R: 4120/21

Instructions for QATS Reference Material: Inorganic ICV Solutions

### **QATS LABORATORY INORGANIC REFERENCE MATERIAL** INITIAL CALIBRATION VERIFICATION SOLUTIONS (ICV1, ICV5, AND ICV6)

These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with

the analyses.

Contains Metals in Dilute Acidic or Cyanide in Basic Aqueous Solutions **HAZARDOUS MATERIAL** 

> Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more Aqueous Inorganic Reference Materials containing various analyte concentrations. ICV1 and ICV5 are in a matrix of dilute nitric acid. ICV6 is in a matrix of dilute basic solution. For the reference material source in reporting ICVs use "USEPA". For the reference material lot number for the ICV1, ICV5, and ICV6 solutions use "ICV1-1014". "ICV5-0415", and "ICV6-0400", respectively.

### (B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

> QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY **APTIM Federal Services, LLC** 2700 Chandler Avenue - Building C Las Vegas, NV 89120

### (C) ANALYSIS OF SAMPLES

The Initial Calibration Verification Solutions (ICVs) are to be used to evaluate the accuracy of the initial calibrations of ICP, AA, and Cyanide colorimetric instruments, and are to be used with the CLP SOWs and revisions. The values for each element in the ICVs are listed below in µg/L (ppb) for the resulting solution(s) after the dilution of the concentrate(s) according to the following instructions. Use Class 'A' glassware to prepare the solution(s).

ICV1-1014

For ICP-AES analysis, use a 10-fold dilution by pipetting 10 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (y/y) nitric acid.

Page 1 of 2



RMs ICV 1, 5, 6 SFAM.docx



# QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

### Instructions for QATS Reference Material: Inorganic ICV Solutions

ICV1-1014

For ICP-MS analysis, use a 50-fold dilution by pipetting 2 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 1% (v/v) nitric acid.

ICV5-0415

For the cold vapor analysis of mercury by AA, use a 100-fold dilution by pipetting 1 mL of the ICV5 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid. The ICV5 concentrate is prepared in 0.05% (w/v) K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> and 5% (v/v) nitric acid.

ICV6-0400

For the analysis of cyanide, use a 100-fold dilution by pipetting 1 mL of the ICV6 concentrate into a 100 mL volumetric flask and dilute to volume with Type II water. Distill this solution along with the samples before analysis. The cyanide concentrate is prepared from K<sub>3</sub>Fe(CN)<sub>6</sub>, Type II water, and 0.1 % sodium hydroxide, and will decompose rapidly if exposed to light.

NOTE: USE TYPE II WATER AND HIGH-PURITY ACIDS FOR ALL DILUTIONS.

### (D) CERTIFIED CONCENTRATIONS OF QATS ICV1, ICV5, AND ICV6 SOLUTIONS

	ICV1-1014	
Element	Concentration (µg/L) (after 10-fold dilution)	Concentration (µg/L) (after 50-fold dilution)
Al	2500	500
Sb	1000	200
As	1000	200
Ba	520	100
Be	510	100
Cd	510	100
Ca	10000	2000
Cr	520	100
Co	520	100
Cu	510	100
Fe	10000	2000
Pb	1000	200
Mg	6000	1200
Mn	520	100
Ni	530	110
K	9900	2000
Se	1000	200
Ag	250	50
Na	10000	2000
Ti	1000	210
V	500	100
Zn	1000	200

	ICV5-0415		ICV6-0400
Element	Concentration (µg/L) (after 100-fold dilution)	Analyte	Concentration (µg/L) (after 100-fold dilution)
Hg	4.0	CN-	99

www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

Part Number:

57056

Solvent:

20510011

Nitric Acid

200

40.0

Nitric Acid

Description: Lot Number:

072122 Barium (Ba)

Certified Reference Material CRM

Riograph 33

Lot #

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

Formulated By: Liovannie Giovanni Esposito appeal 2

072122

Reviewed By: Pedro L. Rentas 072122

IN023 BAD022019A1 RM# Number 5 Conc. (µg/mL) Nominal 1000 99.999 Purity 8 Uncertainty Assay Purity (%) 0.10 52.3 <u>8</u> Weight (g) 3.82417 Target Weight (g) Conc. (µg/mL) 3.82426 Actual 1000.0 Actual +/- (µg/mL) Uncertainty Expanded 2.0 10022-31-8 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information 0.5 mg/m3 orl-rat 355 mg/kg 3104a SRM TSIN

1. Barium nitrate (Ba)

Nominal Concentration (µg/mL):

1000

Ambient (20 °C) 072125

**NIST Test Number:** 

Recommended Storage:

**Expiration Date:** 

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

m/z-> **1/2-**2 17/2-Y 2.5E6 5.0E6 2.0E5 1.0ES 2.0E6 1.OE6 [1] Spectrum No.1 210 110 0 220 120 N O [ 12.514 sec]:58156.D# [Count] [Linear] 130 230 30 140 240 4 250 150 Ö. 160 260 00 170 8 180 80 190 90 200 100

# Certified Reference Material CRM



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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Physical Characterization:

(T)= Target analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.



Certified by:

2 of 2

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

All standard containers are meticulously cleaned prior to use.

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

<sup>\*</sup> All Standards should be stored with caps tight and under appropriate laboratory conditions. Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

<sup>\*</sup> Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Nitric Acid CMOS



M5402 M5403 M5404 M5405 M5406 M5407

Material No.: 9606-03 Batch No.: 22C0462001

Manufactured Date: 2022-02-11

Retest Date: 2027-02-10

Revision No.: 0

### Certificate of Analysis

Test	Specification	Result
Assay (HNO₃)	69.0 - 70.0 %	69.4 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (CI)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO <sub>4</sub> )	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities - Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities - Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	1.2 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	1.7 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities - Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb



Material No.: 9606-03 Batch No.: 22C0462001

Test	Specification	Result
Trace Impurities - Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities - Potassium (K)	≤ 50 ppb	< 10 ppb
Trace Impurities - Silicon (Si)	≤ 50 ppb	< 10 ppb
Trace Impurities - Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	< 5.0 ppb
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Tantalum (Ta)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Thallium (TI)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Tin (Sn)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count - 0.5 μm and greater	≤ 60 par/ml	7 par/ml
Particle Count - 1.0 μm and greater	≤ 10 par/ml	2 par/ml

Nitric Acid CMOS



Material No.: 9606-03 Batch No.: 22C0462001

Test Specification Result

For Microelectronic Use Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC



Certified Deference Metaric Com

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

<u>ئ</u>

Certified Reference Material CRM
[N 403 | 20 | 128 | 125 | 1

ANAB ISO 17034 Accredited AR-1539 Certificate Number https:///Absolutestandards.com

070622 070622 Pedro L. Rentas Lawrence Barry Formulated By: Reviewed By: Nitric Acid Nitric Acid 20510011 Fot # 20.0 (mL) Solvent: 2% 0.058 Flask Uncertainty 5E-05 Balance Uncertainty 1000.12 Ambient (20 °C) Lithium (Li) Weight shown below was diluted to (mL): 57103 070622 070625 10000 **6UTB** Nominal Concentration (µg/mL): NIST Test Number: Lot Number: Description: Expiration Date: Recommended Storage: Part Number: CERTIFIED WEIGHT REPORT:

Γ						ar]	[ 9.619 sec]:58103.D# [Count] [Linear]	# [C	58103.D	sec]::	_	No.1	ctrum	[1] Spectrum No.1	
5	Byfill 0241 ischio	2					10000								
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SEM	LD50	RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50	CAS#	+/- (ug/mL)	Conc. (ug/mL)	Weight (g)	Weight (g)	(%)	Purity (%)	(%)	Conc. (µg/mL)	Number	RM#		БПроппа
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## Certified Reference Material CRM



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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Physical Characterization:

(T)= Target analyte

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in

All standard containers are meticulously cleaned prior to use. the preparation of all standards.

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com



## Certified Reference Material CRM

R: 03/01/23(124)



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Solvent: 2110221 Nitric Acid   Permulated By: Lawrence Barry   D20623   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry   D20623   Cerlum (Co)   1000   Current (20 °C)   1000	Ce)   Solvent: 2110221 Nitric Acid   Formulated By: Lawrence Barry   O20623   (mL)   (mL)
Solvent: 2110221 Nitric Acid   Permulated By: Lawrence Barry   020623   Cerlum (Ce)	Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry   020623   Cerlum (Ce)   2% 20.0 Nitric Acid   Pormulated By: Lawrence Barry   020623   1000   6UTB   5E-05 Baiance Uncertainty   6UTB   Select Select Control   1000   Color   1000
Solvent: 21110221 Nitric Acid   Pormulated By: Lawrence Barry   D20623   Cerlum (Ce)	Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry   020623   Cerlum (Ce)   2% 20.0 Nitric Acid   Pormulated By: Lawrence Barry   020623   1000   6UTB   5E-05 Baiarno Uncertainty   5E-05 Baiarno Uncertainty   Actual   Actual
Solvent: 21110221 Nitric Acid   Pormulated By: Lawrence Barry   D20623   Cerlum (Ce)	Lot #
Solvent: 2110221 Nitric Acid   Permulated By: Lawrence Barry   020623   Cerlum (Ce)	Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry   020623   Cerlum (Ce)   2% 20.0 Nitric Acid   Pormulated By: Lawrence Barry   020623   1000   6UTB   5E-05 Baiance Uncertainty   6UTB   Select Select Control   1000   Color   1000
Solvent: 2110221 Nitric Acid   Formulated By: Lawrence Barry   020623   Cerlum (Ce)	Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry   020623   Cerlum (Ce)
Solvent: 2110221 Nitric Acid   Formulated By: Lawrence Barry   020623   Cerlum (Ce)	Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry   D20623   Cerlum (Ce)
Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry   D20623   Cerlum (Ce)	Solvent: 2110221 Nitric Acid   Portun (20°C)   1000   5E-05 Balance Uncertainty   1000.12 0.056 Flesk Unce
Solvent: 2110221 Nitric Acid   Pormulated By: Lawrence Barry (mL)   1000   5E-05 Balance Uncertainty   Expanded   SDS Information   Expanded   SDS Information	Lot #   Lot #
57058         Solvent:         2110221         Nitric Acid         Permulated By:         Lawrence Barry           020623         20.0         Nitric Acid         Pormulated By:         Lawrence Barry           020826         Ambient (20 °C)         (mL)         Pedro L. Rentas           1000         6UTB         5E-05 Balance Uncertainty         Pedro L. Rentas           ediluted to (mL):         1000.12         0.058 Plask Uncertainty         Expanded         SDS Information	57058         Solvent:         2110221         Nitric Acid         Permulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Pedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Expanded         SDS Information
57058         Solvent:         2110221         Nitric Acid           020623         2%         20.0         Nitric Acid           020626         Ambient (20 °C)         (mL)         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Reviewed By:         Pedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Expanded         SDS Information	Lot #
57058         Solvent:         2110221         Nitric Acid           Certum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Reviewed By:         Pedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas           6UTB         50.058 Plask Uncertainty         SDS Information	Lot #
57058         Solvent:         2110221         Nitric Acid           020623         20.0         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Formulated By:         Lawrence Barry           4 mbient (20 °C)         (mL)         Formulated By:         Lawrence Barry           6UTB         5E-05 Balance Uncertainty         Fedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Fedro L. Rentas	Lot #   Lot
57058         Solvent:         2110221         Nitric Acid           020623         20-110221         Nitric Acid         Pormulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         (mL)         Pedro L Rentas           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L Rentas         Pedro L Rentas	Lot #   Lot   Lot
57058         Solvent:         2110221         Nitric Acid         Pormulated By:         Lawrence Barry           020623         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Reviewed By:         Pedro L. Rentas           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas	Lot #
57058         Solvent:         2110221         Nitric Acid         Pedro L. Rentas           020623         20.00         Nitric Acid         Pedro L. Rentas           020626         Ambient (20 °C)         (mL)         Pedro L. Rentas           4 Illuted to (mL):         1000.12         0.058 Pleast Uncertainty         Pedro L. Rentas	Lot #   Lot #
57058         Solvent:         2110221         Nitric Acid         Pedro L. Rentas           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         1000         (mL)         Formulated By:         Lawrence Barry           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas           6UTB         1000.12         0.058 Plask Uncertainty         Reviewed By:         Pedro L. Rentas	Lot #
57058         Solvent:         2110221         Nitric Acid           020623         20-110221         Nitric Acid         Pormulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         (mL)         Pedro L. Rentas           4 O0012         5E-05 Balance Uncertainty         Pedro L. Rentas         Pedro L. Rentas	Solvent: 2110221 Nitric Acid   Certum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   1000   6UTB   5E-05 Batance Uncertainty   edituted to (mL): 1000.12 0.058   Pask Unce
57058         Solvent:         2110221         Nitric Acid           020623         20-110221         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         (mL)         Mitric Acid         Formulated By:         Lawrence Barry           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas         Pedro L. Rentas	Lot #   Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   1000   6UTB   5E-05 Balance Uncertainty   GUTB   SE-05 Balance Uncertainty   GUTB   GUT
Solvent: 2110221 Nitric Acid   Certum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   1000   6UTB   5E-05 Balance Uncertainty   Illusted to (mL)   1000   100	Lot #   Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   1000   6UTB   5E-05 Balance Uncertainty   GUTB   SE-05 Balance Uncertainty   GUTB
Solvent: 2110221 Nitric Acid   Certum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Multiple (20 °C)   1000   6UTB   5E-05 Balance Uncertainty   Reviewed By: Pedro L. Rentas   Pedro L. Ren	Lot #   Lot #
57058         Solvent:         2110221         Nitric Acid         Permulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Nitric Acid         Formulated By:         Lawrence Barry           4 mbient (20 °C)         1000         6UTB         SE-05 Balance Uncertainty         Reviewed By:         Pedro L. Rentas	Lot #
57058         Solvent:         21110221         Nitric Acid         Permulated By:         Lawrence Barry           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Mind Acid         Mind Acid         Mind Acid           6UTB         5E-05 Balance Uncertainty         Pedro L. Rentas         Reviewed By:         Pedro L. Rentas	Lot #
57058         Solvent:         2110221         Nitric Acid           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         (mL)         Mitric Acid         Formulated By:         Lawrence Barry           4 mbient (20 °C)         1000         6UTB         SE-05 Balance Uncertainty         Pedro L. Rentas	Lot #   Lot #   Lot #   Solvent: 21110221   Nitric Acid   Certum (Ce)   2% 20.0   Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   1000   SE-05 Balance Uncertainty   SE-05 Balance Uncertainty   Reviewed By: Pedro L. Rentas
57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         4mbient (20 °C)         (mL)         Mitric Acid         Formulated By:         Lawrence Barry           6UTB         5E-05 Balance Uncertainty         Reviewed By:         Pedro L. Bentas	57058         Solvent:         21110221         Nitric Acid         Pormulated By:         Lawrence Barry           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         (mL)         Manient (20 °C)         Manient (20 °C)           1000         6UTB         5E-05 Balance Uncertainty         Pedro L. Berrias
57058         Solvent:         2110221         Nitric Acid           020623         200         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Ambient (20 °C)         Mind (20 °C)           1000         6UTB         5E-05 Balance Uncertainty         Barrier         Barrier	Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   1000   5E-05 Balance Uncertainty   Barriage   By: Pacing Barry   Barry   Barriage   By: Pacing Barry   Barriage   By: Pacing Barry   Barriage   By: Pacing Barry   Barriage   By: Pacing Barry   By: Pacing
57058         Solvent:         2110221         Nitric Acid           020623         200         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Mitric Acid         Formulated By:         Lawrence Barry           4 mbient (20 °C)         1000         5E-05 Balance Uncertainty         Bodiest Britishing	57058         Solvent:         21110221         Nitric Acid           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Ambient (20 °C)         Mind Acid         Formulated By:         Lawrence Barry           6UTB         5E-05 Balance Uncertainty         5E-05 Balance Uncertainty         Bodies I Declaration         Bodies I Declaration
57058         Solvent:         2110221         Nitric Acid           020623         2%         20.0         Nitric Acid           020626         Ambient (20 °C)         (mL)         Formulated By:         Lawrence Barry           4 mbient (20 °C)         1000         1000         1000         1000	57058 Solvent: 21110221 Nitric Acid Certum (Ce)  2% 20.0 Nitric Acid Ambient (20 °C) 1000 6UTB  5F-05 Release Investments
57058         Solvent:         21110221         Nitric Acid           Certum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         4mbient (20 °C)         1000         1000         1000	Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   1000   1000   EF OF THE CENTRAL   C
57058         Solvent:         21110221         Nitric Acid           Cerium (Ce)         2% 20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         1000         Marchian (20 °C)         Marchian (20	Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   1000
57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         4mbient (20 °C)         Manual Acid         Manual Acid <td< td=""><td>  Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   1000</td></td<>	Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   1000
57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         4mbient (20 °C)         Mandient (20 °C)         Mandient (20 °C)         Mandient (20 °C)	57058         Solvent:         21110221         Nitric Acid           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           020626         (mL)         (mL)         Ambient (20 °C)         Manual control of the control o
57058         Solvent:         21110221         Nitric Acid           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C) </td <td>57058         Solvent:         21110221         Nitric Acid           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         X         X         X</td>	57058         Solvent:         21110221         Nitric Acid           020623         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         X         X         X
57058         Solvent:         21110221         Nitric Acid         Permulated By:         Lawrence Barry           020626         Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C) <td>57058         Solvent:         21110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         ************************************</td>	57058         Solvent:         21110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         ************************************
57058         Solvent:         21110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         ************************************	Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Certum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   1000
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57058         Solvent:         21110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Mandient (20 °C)         (mL)	Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   Minus (mL)
Solvent: 2110221 Nitric Acid   Solvent: 21110221 Nitric Acid   Certum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   (mL)   Formulated By: Lawrence Barry (mL)   Formulated By: Lawrence By: Lawren	Lot #   Lot #
57058         Solvent:         2110221         Nitric Acid           020623         2%         20.0         Nitric Acid           Ambient (20 °C)         (mL)         Formulated By:         Lawrence Barry	57058         Solvent:         21110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C)         Control of the contro
57058         Solvent:         21110221         Nitric Acid           020623         2%         20.0         Nitric Acid           020626         (mL)         Formulated By:         Lawrence Barry	57058         Solvent:         21110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C)         (mL)         Ambient (20 °C)
57058         Solvent:         21110221         Nitric Acid           Certum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C)         (mL)         Ambient (20 °C)	Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)   Ambient (20 °C)   Ambient (20 °C)   Ambient (20 °C)   Converse   Co
Solvent: 2110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry   Ambient (20 °C)   Ambient (20 °C)   Ambient (20 °C)   Control of the c	57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C)         (mL)         Ambient (20 °C)
57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         Ambient (20 °C)         Ambient (20 °C)         (mL)         Ambient (20 °C)	57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20°C)         Ambient (20°C)         Ambient (20°C)         Ambient (20°C)         Ambient (20°C)
57058         Solvent:         2110221         Nitric Acid           Cerlum (Ce)         2%         20.0         Nitric Acid         Formulated By:         Lawrence Barry           Ambient (20 °C)         (mL)         (mL)         Ambient (20 °C)         (mL)	Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry Ambient (20 °C)   Ambient (20 °C)   Ambient (20 °C)   Cerlum (Ce)   Ce
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57058 Solvent: 21110221 Nitric Acid Cerlum (Ce)  2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot #   Lot #   Lot #   Lot #   Lot #   Solvent: 21110221 Nitric Acid   Cerlum (Ce)   2% 20.0 Nitric Acid   Formulated By: Lawrence Barry (mL)
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57058 Solvent: 21110221 Nitric Acid  Cerlum (Ce)  2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid  020623 Cerlum (Ce)  2% 20.0 Nitric Acid Formulated By: Lawrence Barry
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Compound	RM#	Lot Number	Nominal Conc. (vg/mL)	Purity (%)	Purity Uncertainty Assay (%) Purity (%) (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Actual Uncertainty Weight (g) Conc. (ug/mt.) +/- (ug/mt.)	Uncertainty +/- (ug/mL)	SS	(Solvent Safety Info. On Attached pg.) CAS# OSHA PEL (TWA) LD50	ched pg.) LD50	NIST
Cerium nitrate hexahydrate (Ce)	IN146	IN146 Z512CEB1	1000	88.98	0.10	32.8	3.04919	3.04921 1000.0	1000.0	20	II ==	¥.	ď Z	ĄN
[1] Spectrum N	lo.1 [ 43.472	\$ sec]:58158.D#	[1] Spectrum No.1 [ 43.472 sec]:58158.D# [Count] [Linear]											$\  \cdot \ $
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## Certified Reference Material CRM





ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

(T)= Target analyte

My J. M.

Certified by:

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). All standard containers are meticulously cleaned prior to use.

Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

<sup>\*</sup> All standards should be stored with caps tight and under appropriate laboratory conditions.
\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com 031523 031523 Giovanni Esposito Pedro L. Rentas Liovanni Formulated By: Reviewed By: Certified Reference Material CRM Nitric Acid Nitric Acid Solvent: 21110221 Lot # 60.0 (mL) % 5E-05 Balance Uncertainty 0.058 Flask Uncertainty 3000.41 Ambient (20 °C) Calcium (Ca) Weight shown below was diluted to (mL): 031523 031526 10000 **6UTB** Recommended Storage: Nominal Concentration (µg/mL): Part Number: Lot Number: Description: **Expiration Date:** NIST Test Number: CERTIFIED WEIGHT REPORT:

Compound	RM#	Lot Number	Nominal Purity Conc. (µg/mL) (%)	Punty (%)	Purity Uncertainty Assay (%) Purity (%) (%)		Target Weight (g)	Actual Weight (g)	Expanded Actual Actual Uncertainty (Sc Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS#	Expanded Uncertainty +/- (ug/mL)	(Solv	SDS Information (Solvent Safety Info. On Attached pg.)  NS# OSHA PEL (TWA) LD50	Attached pg.) LD50	NIST
1. Calcium carbonate (Ca)	IN014	INO14 caboragezat	10000 99.999	666.66	0.10	38.9	75.1990	75.2093	10001.4	20.0	471-34-1	5 mg/m3	ort-rat	3109a
[1] S <sub>1</sub>	[1] Spectrum No.1		4.00	8ec]:6	12.514 sec]:58120.D# [Count] [Linear]	<u> </u>	unti (Line	ari						
1.0E4														
m/z->	0	.0		000	.0	400400	0	0	2		0		001	
2. 4 4														
m/z->	0	120		90	140		150	160	071	0	180	190		
6.0E4														
m/z->	019	220		230	240		250	260						

Printed: 3/16/2023, 1:45:15 PM





ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

						Trace Me	tals	Verificat	ioi	by ICP-N	MS (	$(\mu g/m\Gamma)$		r				
SHEW SHEET	STATE OF THE PARTY OF				SIGNATURE .	STON SAFETY SAGE	S. Parlie	THE SHARE SHARE	Series .		Sec.	STREET, STREET	THE PERSON	THE PERSON NAMED IN	THE PERSON	State of the last		
707	ප	<0.02	δ	40.05	H	<0.02	II.	<0.02	Z	<0.02	ď	<0.02	Se	<0.2	13	<0.02	≥	<0.02
700	రో	H	卢	₹0.02	윒	20.02	3	<0.02	ź	<0.02	2	<0.02	ន	<0.02	Į.	40.02	Þ	₹0.05
07	ඊ	<b>40.02</b>	超	<0.02	Я	<0.02	Mg	40.01	ő	<0.02	쥪	<0.02	Ag	<0.02	F	<0.02	>	<0.02
707	ర	<0.02	පි	<0.02	片	<0.02	Mn	<0.02	Z	<0.02	2	<0.02	ž	<0.2	Ę	<0.02	¥9	40.02
100	Ö	<0.02	ජි	40.02	Ŗ	<0.2	Hg	40.2	م	<0.02	æ	<0.02	స	<0.02	Ę,	<0.02	¥	₹0.05
707	රි	40.02	පි	₹0.02	3	₹0.02	Wo	<0.02	五	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	2	₹0.02
707	♂	<0.02	Αū	<0.02	2	<0.02	PN	<0.02	×	40.2	S	<0.02	Ta	<0.02	Ξ	<0.02	Z	40.02
	6.00 6.00 6.00 6.00 6.00 6.00		3 5 5 5 5 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Cd	Cd	Cd	Cd	Cd	Cd         -0.02         Dy         -0.02         Hf         -0.02         Li         -0.02           Ca         T         En         -0.02         Ho         -0.02         Li         -0.02           Ce         -0.02         Eu         -0.02         in         -0.02         Mg         -0.02           Cr         -0.02         Gd         -0.02         Fe         -0.02         Mn         -0.02           Co         -0.02         Ge         -0.02         Fe         -0.02         Mo         -0.02           Cu         -0.02         Au         -0.02         Fe         -0.02         Mo         -0.02	Cd         -60.02         Dy         -60.02         Hf         -60.02         Li         -60.02         Ni           Ca         T         En         -60.02         Ho         -60.02         Lu         -60.02         Nh           Ca         -60.02         Eu         -60.02         In         -60.02         Mn         -60.02         Pd           Cr         -60.02         Ga         -60.02         Fe         -60.2         Hg         -60.2         Pr           Co         -60.02         Ga         -60.02         La         -60.02         Rr         -60.02         Rr           Cu         -60.02         Au         -60.02         Pr         -60.02         Rr	Cd         -6.002         Dy         -6.002         Hf         -6.002         Li         -6.002         Ni         -6.002           Ca         T         En         -6.002         Ho         -6.002         Lu         -6.002         Nh         -6.002           Ce         -6.002         Eu         -6.002         In         -6.002         Mg         -6.012         Nh         -6.002           Cr         -6.002         Gd         -6.002         Fe         -6.02         Mn         -6.02         Pd         -6.02           Cr         -6.002         Gg         -6.002         Fe         -6.02         Hg         -6.02         Pr         -6.02           Cu         -6.002         Au         -6.002         In         -6.002         R         -6.002           Cu         -6.002         Au         -6.002         Ph         -6.002         R         -6.002	Cd         -6.002         Dy         -6.002         Hf         -6.002         Li         -6.002         Ni         -6.002         Pr           Ca         T         Ea         -6.002         Ho         -6.002         Lu         -6.002         Nb         -6.002         Rc           Ce         -6.002         Eu         -6.002         Ir         -6.002         Mn         -6.002         Rb         -6.002         Rb           Cr         -6.002         Ga         -6.002         Fe         -6.02         Hg         -6.02         Pr         -6.02         Ru           Co         -6.002         Ga         -6.002         La         -6.002         Rr         -6.002         Rr           Co         -6.002         Ga         -6.002         Pr         -6.002         Rr         -6.002         Rr           Cu         -6.002         Au         -6.002         Pr         -6.002         Rr         -6.002         Sr	Cd         -d002         Dy         -d002         Hf         -d002         Li         -d002         Ni         -d002         Pr         -d002           Ca         T         Ba         -d002         Ho         -d002         Lu         -d002         Nb         -d002         Rb         -d002           Ca         -d002         Ba         -d002         Ir         -d002         Mn         -d002         Rb         -d002         Rb         -d002           Cr         -d002         Ga         -d002         Hg         -d02         Pr         -d002         Ru         -d002           Co         -d002         Ga         -d002         Na         -d002         Rr         -d002         Sa         -d002           Cu         -d002         Au         -d002         Na         -d002         Rr         -d002         Sa         -d002           Cu         -d002         Au         -d002         Na         -d002         Rr         -d002         Sa         -d002	Cd         -d002         Dy         -d002         Hf         -d002         Li         -d002         Ni         -d002         Re         -d002         Si           Ca         T         Ea         -d002         Ho         -d002         Lu         -d002         Nb         -d002         Re         -d002         Si           Ca         -d002         Ea         -d002         Hr         -d002         Mn         -d002         Rh         -d002         Na           Cr         -d002         Ga         -d002         Hg         -d02         Pr         -d002         Ru         -d002         Na           Co         -d002         Ga         -d002         Hg         -d002         Rr         -d002         Sr         -d002         Sr           Co         -d002         Ga         -d002         Hg         -d002         Rr         -d002         Sr         -d002         Sr           Cu         -d002         Au         -d002         Nd         -d002         Rr         -d002         Sr         -d002         Sr         -d002         Sr	Cd         -0.02         Dy         -0.02         Hf         -0.02         Li         -0.02         Ni         -0.02         Pr         -0.02         Se         -0.02           Ca         T         Eu         -0.02         Ho         -0.02         Lu         -0.02         Nb         -0.02         Rb         -0.02         Si         -0.02           Ce         -0.02         Eu         -0.02         In         -0.02         Mn         -0.02         Rb         -0.02         Na         -0.02           Cr         -0.02         Ga         -0.02         Ir         -0.02         Hg         -0.02         Ru         -0.02         Na         -0.02           Cr         -0.02         Ga         -0.02         Hg         -0.02         Ru         -0.02         Sr         -0.02           Cr         -0.02         Ga         -0.02         Hg         -0.02         Rr         -0.02         Sr         -0.02           Cr         -0.02         Fr         -0.02         Nr         -0.02         Rr         -0.02         Sr         -0.02           Cr         -0.02         Fr         -0.02         Rr         -0.02         Sr	Cd         4002         Dy         4002         H         4002         Li         4002         Ni         4002         Pr         4002         Se         402         Th           Ca         T         Ea         4002         Ha         4002         Lu         4002         Nb         4002         Rb         4002         Tr           Ca         4002         Eu         4002         Ha         4002         Pd         4002         Rb         4002         Tr           Cr         4002         Ga         4002         Hg         402         Pr         4002         Ru         4002         Tr          Cr         4002         Ga         4002         Hg         402         Pr         4002         Ru         4002         Tr          Cr         4002         Ga         4002         Hg         402         Pr         4002         Sr         4002         Tr          Cr         4002         Au         4002         Rr         4002         Rr         4002         Sr         4002         Sr         4002           Cu         4002         Au         4002         Rr         4002         Rr         4002

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.



Certified by:

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<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in

All standard containers are meticulously cleaned prior to use. the preparation of all standards.

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

<sup>\*</sup> Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). \* All Standards should be stored with caps tight and under appropriate laboratory conditions.

Certified Reference Material CRM

R : 03 | 17 | 12



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Diovanne

Nitric Acid

Solvent: 20510011

#ioj

Nitric Acid

350.0 (m)

7.0%

092122 092122 Giovanni Esposito Pedro L. Rentas Formulated By: Reviewed By:

٠.		
SDS Information	(Solvent Safety Info, On Attached pg.)	L) CAS# OSHA PEL (TWA) LD50
Expanded	Actual Actual Uncertainty	1/- (ug/mL)
	Actual	Conc. (ug/mL)
		_
1	arget	Weight (g)
	Assay	9
1	unity Unkertality Assay	runty (%)
Dringer	runcy (85)	R
Nominal	Conc (un/ml)	COLLEG (ARRYTHL)
ŧ	Number	
	RM#	
	Compound	

5E-05 Balance Uncertainty 0.12 Flask Uncertainty

5000.1

Weight shown below was diluted to (mL):

NIST Test Number:

Ambient (20 °C)

10000 **6UTB** 

092125

Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):

Iron (Fe) 092122

Description: Lot Number:

Part Number:

CERTIFIED WEIGHT REPORT:

128 128	orl-rat 7500mg/kg 3126a	no Em/gm c	1409-09-0	Ш										
			20.0 7430.80.6		0.10 100.0 50.0034 50.0111 10001.5	50.0111	50.0034	100.0	0.10	98.985	10000	3 2224912-500	IN34	Iron (Fe)
SKE	LUSO	COLOR FEET (TWA)	L COLON											
2	(34)	OCHA DEI (TAKA)	CAC#	(  m/m/) -/+	Conc. (vo/ml.)	Weight (g)	Weight (g)	(%)	Purity (%)	<u>8</u>	Conc. (µg/mL)	Number	KMH	
1	7 00 00	Uncertainty Assay Target Actual Actual Uncertainty (Solvient Safesy Info On Actual	(Soh	Uncertainty	Actual	Actual	y Uncertainty Assay Target	Assay	Uncertainty	Purity	Nominal	5		Compound
										-	-	- made		

		110-10 SEE4912-000	2000	99.985	0.10	100.0	50.0034	50.0111 10001.5	10001.5	20.0	7439-89-6	5 mg/m3	orl-rat 7500mg/kg 3126a
2.064	1) Spectrum No.1	[1] Spectrum No.1 [ 30.763 sec]:58126.D# [Count] [Linear]	[Count] [Linear]					_					
1.054								_					
m/z->	10-1	50	0 8		-6		.00	-09	02		08	. 06	100
5.0E7	110	120	130		140		150	160	170		180	0 61	500
S.0E7	0.6												
L	1	220	230		240		250	260					

## Certified Reference Material CRM





# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							Trace Me	stals	Verificat	ion b	y ICP-MS	gu)	/mL)						
STORY .	000				200		404				NAME OF TAXABLE PARTY.								
æ	40.02	3	70.05	ŝ	70'0>	Ē	70102	3	Z0702	ž	<0.10	£	<b>₹0.02</b>	š	402	e	<b>40.02</b>	*	40.02
S.	<0.02	రే	<b>4</b> 02	山	<0.02	He	<b>40.02</b>	3	<0.02	ź	<0.02	Re	<0.02	ૹ	<b>40.02</b>	<u>6</u>	<0.02	n	<0.02
As	Ø.2	ප	<0.02	큡	<0.02	멸	<0.02	Mg	<0.01	ő	<0.02	꿆	<0.02	Ag	<0.02	F	<0.02	>	<0.02
Ba	<b>40.02</b>	ඊ	Ø.02	3	<0.02	ㅂ	<b>40.02</b>	Ma	<0.10	몺	<0.02	8	<0.02	Š	40.2	Ē	<0.02	χ.	<0.02
Be	<b>₩</b>	ŏ	<b>40.05</b>	පී	<0.02	£	40.2	Hg	40.2	Δ.	<0.02	Ru	<0.02	Ŗ	<0.02	뎚	<0.02	<b>X</b>	<0.02
Ä	<b>40.02</b>	රි	Ø.10	ප	40.10	ጟ	<b>40.02</b>	Mo	<b>40.02</b>	£	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Z	<0.05
В	<0.02	ರ	<0.10	ΑΠ	<0.02	£	<0.02	R	<0.02	M	<0.2	ß	<0.02	Ta	<0.02	F	<0.02	Z	<0.02

(T)= Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.



Certified by:

The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

All standard containers are meticulously cleaned prior to use.

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). \* All Standards should be stored with caps tight and under appropriate laboratory conditions.

2 of 2

### CORCO CHEMICAL CORPORATION

Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

### **CERTIFICATE OF ANALYSIS**

Date: 8/3/2022

MS631 MS632 MS633 MS634

Lot No 820803

### Hydrogen Peroxide, ACS

Reagent Grade

TEST	MAXIMUM LIMITS	RESULT
Appearance	Colorless and free from suspended matter or sediment	Pass
Assay	29-32%	31.4%
Color (APHA)	10	5
Residue after Evaporation	0.002%	.0001%
Titratable Acid	0.0006 meg/g	< .0006 meq/g
Chloride (CI)	2 ppm	< 1 ppm
Nitrate (NO <sub>3</sub> )	2 ppm	< 1 ppm
Phosphate	2 ppm	< 1 ppm
Sulfate (SO <sub>4</sub> )	5 ppm	<.5 ppm
Ammonium (NH <sub>4</sub> )	5 ppm	< 1 ppm
Heavy Metals (as Pb)	1 ppm	< .1 ppm
Iron (Fe)	0.5 ppm	< .1 ppm
Sodium Stannate	200 – 300 ppb	Pass

<sup>\*\*\*</sup>Our Hydrogen Peroxide is considered un-stabilized because it is very slightly stabilized with Sodium Stannate, 500 ppb maximum, just for safety purposes.

Date of MFG: 8/2022 Retest date: 8/2024

Gina M. Rambo-Office Manager

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: 58024 060523 Chromium (Cr) 21110221 Lot # Nitric Acid Solvent: Lavense

2.0% 40.0 Nitric Acid

(III)

Formulated By:

Lawrence Barry

060523

060523

Nominal Concentration (µg/mL): Recommended Storage: **Expiration Date:** 1000 Ambient (20 °C) 060526

Compound Volume shown below was diluted to (mL): NIST Test Number: Number Part **BTU9** Number Lot 2000.02 Factor Dilution Vol. (mL) Pipette (mL) Conc. (µg/mL) 0.058 5E-05 Initial Flask Uncertainty **Balance Uncertainty** Uncertainty Nominal Conc. (µg/mL) Conc. (µg/mL) Initial Final Reviewed By: +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) Pedro L. Rentas **SDS Information** 

P20

TSIN SRM

3112a

 Chromium(III) nitrate nonahydrate (Cr) 58124 071122 0.1000 200.0 0.084 1000 10000.1 1000.0 12 7789-02-8 0.5 mg(Cr)/m3 ort-rat 3250 mg/kg

m/z->	N 5 10	5.0E5	5.0E5	m/z->	5000	1.004
				3		
N 0		110		<b>o</b> .		
h				7		(
N N N N		120		N. O		(
230		130		۵. ۵.		
						(
240		140		ò		
N		<u></u>		(h O		
250		150		0		
260		160		0		
		170		70		
		380		<b>8</b> 2.		
		0				
		190		90		
		N 0- 0		100		
		Ŏ		0		



# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

			_				_			=
	B	ᄧ	Ве	В	As	Sb	Δ	Monthly		
	A).02	<b>4</b> 0.02	0,01	<b>A</b> .02	<b>40.2</b>	△0.02	△0.02			
	δ	පි	Ω	င္တ	දි	ర్జ	Ω			
	<b>40.02</b>	<b>40.02</b>	<b></b> )	40.02	40.02	40,2	△0.02			
	Æ	ဂ္ဂ	වූ	ନ୍ଥ	멸	녆	Dy	80		
	<b>40.02</b>	40.02	40.02	<0.02	40.02	40.02	40.02	mineral differences		
	3	Ľ	स्र	Ħ	ď	ᅜ	Ж	Sheriff tool		
	<b>40.02</b>	40.02	40.2	A).02	<0.02	40.02	40.02		I race M	1
	폺	Мо	В.	Ķ	ВМ	Ē	П	MISSON ISSUE	Metals	1
3	A0.02	40.02	40.2	40.02	40.01	<b>∆</b> .02	40.02	SI RECEIPTOR	Verification	
Towns and the	~	ን	70	굕	ô	₹	3	SHEWNING.	Clon	-
	<b>∆</b> 0.2	40.02	40.02	40,02	40.02	40.02	40.02	THE PARTY OF THE P	by ICP-M	
	Sc	Sm	잗	공	Rh	æ	Pr		S (Hi	5
	<0.02	<0.02	<0.02	40.02	40,02	40.02	<0.02		g/mL)	
	Ta	S	ñ	Z.	Ą	Si.	Se			
	40.02	<0.02	40.02	402	<b>40.02</b>	40.02	402			
	==	Sn	Tm	Ħ	ᄇ	급	176			
	40,02	40.02	40,02	40,02	<0.02	40,02	<0.02	Contract Contraction		
	Z	Zn	~	뀱	۷	Ϥ	W	国際経済経済		
	<0.02	<b>&lt;</b> 0.02	<0.02	<0.02	40.02	<b>△0.02</b>	<0.02	SALES OF STREET		

(I)= larget analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in

the preparation of all standards.

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\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

### Absolute Standards, Inc.

800-368-1131 www.absolutestandards.com



### Certified Reference Material CRM

M5697



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

**CERTIFIED WEIGHT REPORT:** 

Part Number:

58029

Lot Number:

102523

Description:

**Expiration Date:** 

**NIST Test Number:** 

Copper (Cu)

Ambient (20 °C)

2.0%

Lot #

24002546

40.0

Nitric Acid Formulated By:

(mL)

Solvent:

Nitric Acid

Reviewed By:

Expanded

+/- (µg/mL)

Pedro L. Rentas 102523

Recommended Storage: Nominal Concentration (µg/mL):

1000

102526

**6UTB** 

5E-05 Balance Uncertainty

Volume shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

Final Uncertainty

SDS Information (Solvent Safety Info. On Attached pg.)

NIST

3114

Compound

Part Number Number

Dilution Factor

Initial

Uncertainty

Nominal Pipette (mL) Conc. (µg/mL)

1000

Initial Conc. (µg/mL) Conc. (µg/mL)

OSHA PEL (TWA)

Benson Chan

LD50 SRM

102523

1. Copper(II) nitrate trihydrate (Cu)

58129

10

110

100223

20

120

Lot

0.1000

200.0

0.084

10000.1

1000.0

2.2

10031-43-3

CAS#

1 mg/m3 ori-rat 794 mg/kg

[1] Spectrum No.1 [ 33.422 sec]:58029.D# [Count] [Linear] 1.0E6



 $m/z \rightarrow$ 

5.0E7

2.5E7

m/z->

2.0E7

1.0E7

m/z-> 210 130

30

140

150

50

160

60

170

70

180

80

190

90

200

100

220 230 240 250

260





ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

### Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

0.5			DOM: NO.				Trace M	etals	Verifica	tion	by ICP-M	S (µ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Тъ	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	ΰ	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	п	<0.02	v	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	< 0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Ве	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	T	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Та	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

### **Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

Box 1. 8/1

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

ırt # 58029

Lot # 102523

2 of 2

Printed: 10/26/2023, 1:20:31 PM

### Absolute Standards, Inc.

800-368-1131 www.absolutestandards.com



### Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Lot#

24002546

CERTIFIED WEIGHT REPORT:

Part Number:

58025

102623

Lot Number: Description:

Manganese (Mn)

Ambient (20 °C)

2.0%

60.0

Nitric Acid

(mL)

Solvent:

Nitric Acid

Reviewed By:

Expanded

Formulated By:

102623

102623

**Expiration Date: Recommended Storage:** 

Nominal Concentration (µg/mL): 1000 **NIST Test Number:** 

**6UTB** 

102626

Balance Uncertainty 5E-05

Volume shown below was diluted to (mL):

3000.41

0.058 Flask Uncertainty

Lot

Dilution

Initial Uncertainty Initial

Uncertainty

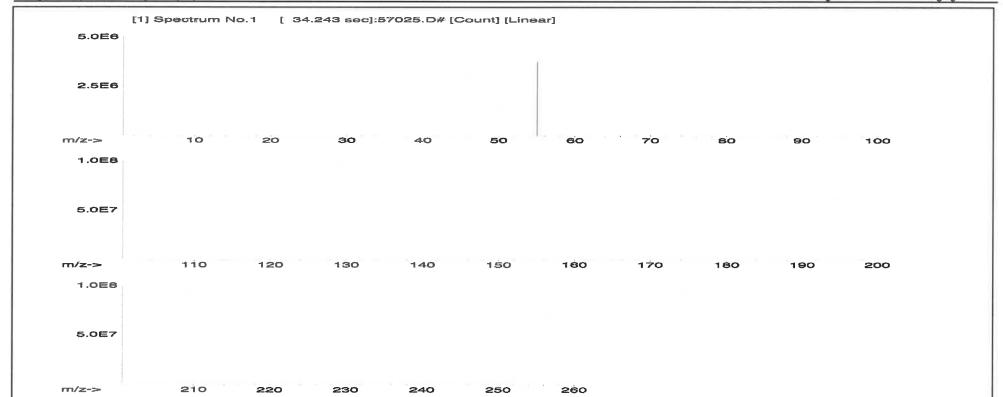
(Solvent Safety Info. On Attached pg.)

**SDS Information** 

Pedro L. Rentas

Benson Chan

Part Nominal Final NIST Compound Number Vol. (mL) Pipette (mL) Conc. (µg/mL) CAS# OSHA PEL (TWA) LD50 Number Factor Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) SRM 1. Manganese(II) nitrate tetrahydrate (Mn) 58125 071123 0.1000 300.0 0.084 1000 10000.1 1000.0 2.1 20694-39-7 5 mg/m3 orl-rat >300mg/kg 3132





### Certified Reference Material CRM



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

### Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							Trace M	etals	Verifica	tion	by ICP-M	IS (µ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Ть	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	T1	<0.02	l v	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir,	<0.02	Mn	T	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	< 0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

### **Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the balances that are calibrated with weights traceable to NIST (see above).

<sup>\*</sup> Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

<sup>\*</sup> All standards should be stored with caps tight and under appropriate laboratory conditions.

<sup>\*</sup> Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM MSTHT

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Part Number: R: 12/20/23 Lot #

Nitric Acid

Solvent: 24002546

2%

Nitric Acid

Formulated By:

Lawrence Barry

100923

60.0

**Lot Number:** Description: 57082 100923 Lead (Pb)

**Expiration Date:** 100926

Recommended Storage: **NIST Test Number:** BIN9 1000 Ambient (20 °C)

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): 3000.41 0.06 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By:

Cot

Nominal

Purity

Uncertainty Assay

			1000.0 2.0 10099-74-8 0.05 mg/m3	0 2.0 10		0.10 62.5 4.80071 4.80077	62.5	0.10	99.999	1000	N029 PBD122016A1	Lead(II) nitrate (Pb)
--	--	--	----------------------------------	----------	--	---------------------------	------	------	--------	------	------------------	-----------------------

Target Weight (a) Con Actual Actual Uncertainty +/- (ua/mL) Expanded #SAC SDS Information
(Solvent Safety Info. On Attached pg.)
(SONA PEL (TWA) TSIN

Pedro L. Rentas

100923

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## Physical Characterization:

(1)= Target analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in
- \* All standard containers are meticulously cleaned prior to use.

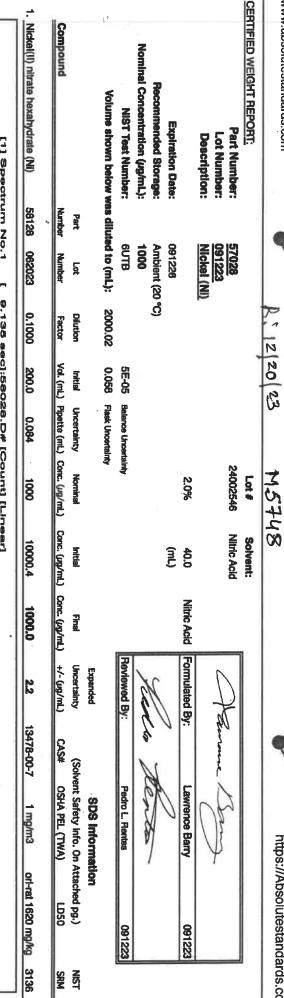
the preparation of all standards.

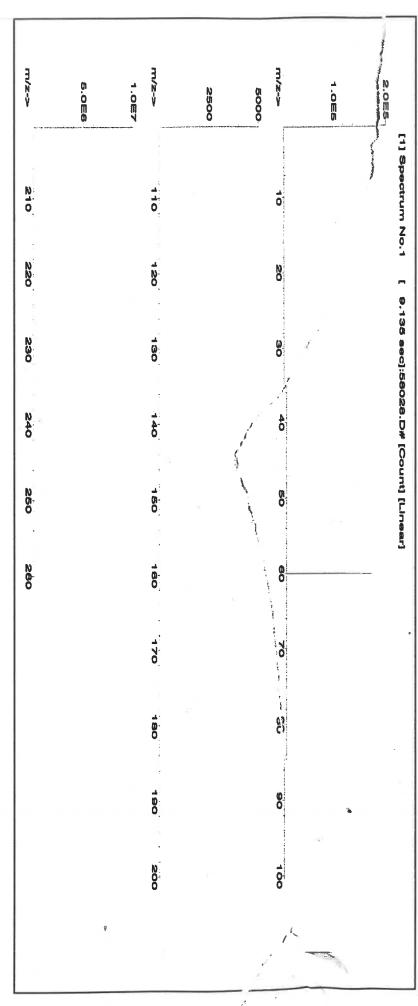
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
  \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Certified Reference Material CRM



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number





800-368-1131

Absolute Standards, Inc.

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this Kandard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
\* Printed acids, 18.2 megohm delonized water, calibrated Class A glassware and the highest purity raw materials are used in

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\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

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## M5768 [M576] (B) R:1/3/24 Certified Reference Material CRM



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Magnesium nitrate hexahydrate (Mg) IN030 марозгозат Compound Nominal Concentration (µg/mL): m/z-> ~-z/m m/z-> Weight shown below was diluted to (mL): Recommended Storage: 2.0≡4 1.0E4 5.0E5 1.0E6 1000 2000 NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 210 0 쭕 **BTUB** 58112 091823 10000 Ambient (20°C) (M5+18), (M5+16) 091826 Magnesium (Mg) Number 120 ğ 20 [ 19.923 sec]:58112.D# [Count] [Linear] Conc. (µg/mL) 2000.02 0.058 Flask Uncertainty 10000 Nominal 130 230 30 5E-05 Balance Uncertainty 99.999 Purity Uncertainty Assay 8 Purity (%) (%) 140 0.10 240 40 Solvent: 24002546 Nitric Acid 8.51 150 234.9118 Weight (g) Target Lot # Ē Weight (g) Conc. (µg/mL) 234.9126 Nitric Acid Actual 160 260 0 10000.0 Actual 170 6 +/- (µg/mL) Expanded Uncertainty Reviewed By: Formulated By: 20.0 180 80 13446-18-9 (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 Pedro L. Rentas Lawrence Barry 190 **SDS Information** Ö Z 200 100 orl-rat 5440 mg/kg 3131a 091823 091823 SRM

### https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(T) = Target analyte

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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## Certified Reference Material CRM



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Part Number: 57004 102523 02/09/24 Lot # Solvent:

24002546 Nitric Acid

2.0% (IE)

Nominal Concentration (µg/mL):

NIST Test Number:

BTU<sub>9</sub> 1000

Volume shown below was diluted to (mL):

2000.02

0.058

Flask Uncertainty Balance Uncertainty

5E-05

Number

Number Lot

Vol. (mL.)

Part

Dilution Factor

hitia

Uncertainty

Recommended Storage:

Ambient (20 °C) 102526

**Expiration Date:** 

Lot Number: Description:

Beryllium (Be)

40.0

Nitric Acid

Benson Chan

102523

Formulated By:

Reviewed By:

Pedro L. Rentas 102523

Pipette (mL) Conc. (µg/mL) Nominal Conc. (µg/mL) Conc. (µg/mL) Final +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information LD50 NIST SRM





800-368-1131



## Certified Reference Material CRM

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							Trace M	etals	Verificat	cation	by ICP-M	(J) SI	ua/mL)						
	TATES AND AND		District Color	ACCOUNTS OF		STATE OF	STATISTICS OF THE PARTY.	SOMETHINGS.	STATE OF STATE OF	SAMOOGE STATE	SECOND SPIRED	No. of Lot	. 18						
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Ba	<0.02	ర	<0.02	3	<0.02	ㅂ	<b>40.02</b>	Mn	<0.02	2	<0.02	8	<0.02	Z	40.2	Ħ	<0.02	2	<0.02
æ	Т	Ç	<b>40.02</b>	Ğ	<b>40.02</b>	2	<b>40.2</b>	Hg	<02	Δ,	<0.02	Ru	<0.02	š	<0.02	Tm	₹0.02	×	<0.02
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æ	<0.02	ರೆ	<0.02	Au	<0.02	£	<b>40.02</b>	PK	<0.02	M	<0.2	S	<b>40.02</b>	Ta	<0.02	F	<0.02	Z	<b>40.02</b>

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

### Certified by:



All standard containers are meticulously cleaned prior to use.

2 of 2

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

122



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

## CERTIFIED WEIGHT REPORT:

Part Number: Description: Lot Number: 57050 071123 Tin (Sn)

Salvents: 21110221

Nitric Acid Hydrochloric acid

Lot #

22D0562008

Nominal Concentration (µg/mL): Recommended Storage: **NIST Test Number:** Expiration Date: 1000 Ambient (20 °C) 071126

Weight shown below was diluted to (mL): **BTU9** 499.93

RM#

Number

Conc. (µg/mL) Nominal

(%)

Uncertainty Assay
Purity (%) (%)

Weight (g)

Target

ρţ

0.058 Flask Uncertainty 5E-05 Balance Uncertainty

> 10.0 30.0

3 6%

Nitric Acid

Formulated By:

Benson Chan

071123

Hydrochloric acid

Reviewed By:

Pedro L. Rentas

071123

Weight (g)	ACTUAL	
Conc. (µg/ml.)	Actual Ur	
'- (µg/mL)	certainty	xpanded
CAS# OSHA PEL (TWA) LD50	(Solvent Safety	SUS
PEL (TWA)	y Info. On Attache	Information
LD50	d pg.)	
SRM	TSIN	

1. Ammonium hexafluorostannate(IV) (Sn) m/z-> ---X/m --Z/111 2.5E4 5.0E4 1.0ES 2.0E6 2.5E5 S.OEG [1] Spectrum No.1 210 110 0 IN010 SND042023A1 120 220 N [ 15.034 sec]:58150.D# [Count] [Linear] 1000 230 130 8 240 140 0.10 40 44.2 250 150 Ö 1.13107 1.13286 160 260 60 1001.6 170 70 2.0 180 80 16919-24-7 190 90 7 mg/m3 200 100 ₹ 3161a



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# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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	3 2 × 3 × C *	
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(I) = larget analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. the preparation of all standards.

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\* All standards should be stored with caps tight and under appropriate laboratory conditions.
\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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Certified Reference Material CRM

R: 02109124





ANAB ISO 17034 Accredited AR-1539 Certificate Number https:///Absolutestandards.com 091923 091923 (Solvent Safety Info On Attach SDS Information Pedro L. Rentas Lawrence Barry Formulated By: Reviewed By: Expanded Nitric Acid Final Nitric Acid 40.0 (III) hital 24002546 2.0% Nominal Balance Uncertainty Flask Uncertainty 5E-05 0.058 Initial 2000.02 Dilution Ambient (20 °C) Cobalt (Co) Volume shown below was diluted to (mL): 57027 091923 091926 ĕ 1000 **6UTB** Part Description: **Expiration Date:** Recommended Storage: Nominal Concentration (ug/mL): NIST Test Number: Part Number: Lot Number: CERTIFIED WEIGHT REPORT:

						TANK BURNE	10000	CHICAGO CONTROL CONTRO	URCH LABILLY	ianioc)	(Solvent Safety Into, On Attached pg.)	ttacned pg.)	202
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL) C	conc. (ug/ml.)	Conc. (µg/mL)	Conc. (ug/ml.)	+/- (ng/mL)	CAS#	Number Number Factor Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA)	1050	SRM
Cobatt(II) nitrate hexahydrate (Co) 58127 050923 0.1000 200.0	58127	050923	0.1000		0.084	1000	10000	100001 100001	9.0	10008.000	000		- 5
							2,000		7:5	100c0-22-9	O.UZ ING/IRIS	STEE SOCIETY OF ING/IIIS OFF-181 Mg/Kg 3113	3113
Spec	N Ent	1.0	0 5000 PE	CAN-LOG	THE REAL PROPERTY.	[1] Spectrum No.1 F at 104% pool 104 De 104 main a language							

1.056	5.0E5	m/z->	5.0E7	1.0E8	5.067
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		-0 -0		120	
L 34-243 Secj.baok7.D# [Count] [Linear]		O Ø		130	
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		9		150	
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				160	
		20		170	
		80		180	
		08		0001	
		100		800	

Lot # 091923

250

240

230

220

010

W/Z->

## Certified Reference Material CRM





ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

							Trace M	etals	Verifical	tion	by ICP-M	4S (F	ig/mL)						
1							STREET, STREET	No section lives	ALL DESCRIPTION OF THE PERSON	10.000	Market Mark	MINNSH.	San Salar Salar	NAME OF TAXABLE PARTY.	Service of the last	SECOND STATES		THE REAL PROPERTY.	A STATE OF STREET
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æ	<0.02	ට්	<0.02	Αn	<0.02	윤	Z0'0>	P	<0.02	м	40.2	S	₹0.02	Fee Fee	<b>40,02</b>	Ħ	Ø.02	72	Ø.02

(T)= Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.



<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.



Lot # 091923

All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

<sup>\*</sup> All standards should be stored with caps tight and under appropriate laboratory conditions.
\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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### 02/00/24 Certified Reference Material CRM

W 580



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CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: Expiration Date: Part Number: Description: Lot Number: 57033 111323 Arsenic (As) **BTUB** 1000 111326 Ambient (20 °C) 5E-05 Balance Uncertainty 24002546 Lot# 2.0% Nitric Acid Solvent: 80.0 Nitric Acid Formulated By: Reviewed By: Therence Pedro L. Rentas Lawrence Barry

1. Arsenic (As)

58133

020522

0.1000

400.0

0.084

1000

10001.0

1000.0

2.0

7440-38-2

0.5 mg/m3

orl-rat 500 mg/kg 3103a

Number Part

Number Lot

Vol. (mL)

Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/ml.) Uncertainty Expanded

(Solvent Safety Info. On Attached pg.) OSHA PEL (TWA)

LD50

NIST SRM

SDS Information

111323

111323

Dilution Factor

initial

Uncertainty

Nominal

Initial

Final

Compound

Volume shown below was diluted to (mL):

4000.0

0.06

Flask Uncertainty

m/z->	500	1000	N is m 4	m/z-y 5.0E4	1.025	2.0E5
						3
N 0		110		ō		[] Speatrum No.1
						Z 0.1
000		0		N.		ő
230		130		30		[ 34.433 sec]:57033.D# [Count] [Linear]
				er gere		90]:570
N 40		140		ò		933.D#
N 0		-d-		50		[Count]
Ö		Ö		0		Lines
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		170		70		
		180		80		
		0				
		190		90		
		an.	-			
		200		100		

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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	Z Z Y Z < C &		
	40.02 40.02 40.02 40.02 40.02		

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## Certified Reference Material CRM

Solvent: MKBQ8597V Ammonium hydroxide

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CERTIFIED WEIGHT REPORT: R - 02 00 124 M.5814

Part Number: Lot Number: 57005 071123

Description: Boron (B)

Nominal Concentration (µg/mL): Recommended Storage: 1000 Ambient (20 °C)

**Expiration Date:** 

071126

2.0%

Ammonium hydroxide

Formulated By:

Benson Chan

071123

tento

40.0

Weight shown below was diluted to (mL): 1999.48 0.058 Flask Uncertainty

RM#

Number

Purity (%)

3

**NIST Test Number:** ğ Nominal Purity 5E-05 Balance Uncertainty Uncertainty Assay Target Actual Reviewed By: Expanded Pedro L. Rentas **SDS Information** 

071123

1. Boric acid (B) IN018 BV092016A1 Conc. (µg/mL) 9 8 0.10 17.3 11.55772 Weight (g) 11.56201 1000.4 120 10043-35-3 2 mg/m3 orl-rat 2660 mg/kg 3107

Actual +/- (µg/mL) Uncertainty CAS# (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 OSHA PEL (TWA)

NIST SRM

Weight (g) Conc. (µg/mL)

[1] Spectrum No.1 [ 12.275 sec]:58105.D# [Count] [Linear]

17/Z-V <-Z/111 m/z-> 2.5EG 5.0E6 2.5E6 S.OE6 1.0E4 2.0≡4 110 1210 0 120 220 Ŋ 130 230 30 140 240 40 150 250 (I) O 200 160 60 170 70

180

190

200

80

90

100

Part # 57005

Printed: 2/8/2024, 5:01:07 PM

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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	666666666666666666666666666666666666666	/Jg/mL)	
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	Ta da da		
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## Physical Characterization:

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Certified by:

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Certified Reference Material CRM

R102109124

MURIC

Solvent: 21110221

Nitric Acid

Lot #

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:** 

57115 041723

Description:

Phosphorous (P)

**Expiration Date:** 

041726

Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: 10000 Ambient (20 °C)

**BTUB** 

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.02

Number 5 Conc. (µg/mL) Nominal 0.058 Flask Uncertainty Purity 3 Uncertainty Assay Purity (%) E Weight (g) Target

Compound

RM#

22%

40.0

Nitric Acid

Formulated By:

Lawrence Barry

041723

into

Reviewed By:

Pedro L. Rentas

041723

Weight (g) Conc. (ug/mL) Actual +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.)

# OSHA PEL (TWA) LD50 SDS Information

NIST SRM

Actual

1. Ammonium dihydrogen phosphate (P) m/z-> m/z-> 5.OE4 2.5E4 5000 1000 500 [1] Spectrum No.1 110 0 IN008 PV082019A1 120 N O [ 12.074 sec]:58115.D# [Count] [Linear] 10000 130 30 99,999 0.10 140 40 27.5 150 50 72.7287 72.7289 160 60 10000.0 170 0 20.0 180 80 7722-76-1 190 0 5 mg/m3 100 200 orl-rat >2000mg/kg 3186

m/z->

210

220

230

240

250

260

2500

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

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	Z	Mo	Hg	Mn	Mg	Lu	Ľ		letals	
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	~	ጀ	۳	æ	Ŝ	₹	Z	į	tion	
	Ą	<b>40,02</b>	7	0.02	<0.02	40.02	40,02		by ICP-N	
	Sc	Sm	R <sub>L</sub>	R.	æ	æ	27		E SI	
	40.02	40.02	40.02	40.02	<b>∆</b> 0.02	A 02	40.02	ļ	g/mL)	The second second
	T <sub>B</sub>	S	Ş	Z	≱	S	&			
	40.02	<b>∆</b> .02	<b>6.02</b>	<u>\$</u>	<b>∆</b> 0,02	40.02	40.2			
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	<0.02	<b>6002</b>	A).02	A0.02	& .02 .03	A0.02	40.02			

(I)= larget analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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2 of 2

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### R1 02/09/124 Certified Reference Material CRM

M5816

CERTIFIED WEIGHT REPORT

Part Number:

Lot Number: Description:

57016 122923

Solvent:

122923

**ASTM Type 1 Water** 

Lot #

**Expiration Date:** 122926 Sulfur (S)

Nominal Concentration (µg/mL): NIST Test Number: 1000

Recommended Storage:

Ambient (20 °C)

Weight shown below was diluted to (mL): 4000.0 5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

Reviewed By:

Pedro L. Rentas

122923

tento

Formulated By:

Benson Chan

122923

 Ammonium sulfate (S) IN117 SLBR7225V <del></del> Number Conc. (µg/mL) 1000 99.9 38 Purity (%) 0.10 24.3 38 Weight (g) 16.4979 Weight (g) Conc. (µg/mL) 16.4980 1000.0 +/- (µg/mL) 20 7783-20-2 CAS# SDS Information
(Solvent Safety Info. On Attached pg.)
LD50 ¥ orl-rat 4250mg/kg 3181 SRM

1/Z-V m/z-> m/z-> N.SES S.OEB 5.OE7 1.0**E**8 N. SES 5.0E5 [1] Spectrum No. 1 210 110 0 120 ななり 0 [ 33.603 sec]:57016.D# [Count] [Linear] 130 230 30 140 240 40 250 150 000 160 200 00 170 0 180 80 190 00 200 100

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Part # 57016

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

(I) = larget analyte

## **Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

the preparation of all standards.

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\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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Certified Reference Material CRM

109/24

M5817

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CERTIFIED WEIGHT REPORT:

Part Number: Lot Number: 071123 57116

Solvent:

071123

**ASTM Type 1 Water** 

Burense

Formulated By:

Lawrence Barry

071123

Lot #

**Expiration Date:** Description: 071126 Sulfur (S)

Nominal Concentration (µg/mL): NIST Test Number: 10000 Ambient (20 °C)

Recommended Storage:

EU1B

Weight shown below was diluted to (mL): 1999.48 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas SDS Information

 Ammonium sulfate (S) IN117 SLBR7225V 10000 99.9 0.10 24.3 82.4675 82,4682 10000.1 20.0 7783-20-2 Z orl-rat 4250mg/kg 3181

Number Ĕ Conc. (µg/mL) Purity 8 Uncertainty Assay Purity (%) 8 Weight (g) Target Weight (g) Conc. (µg/mL) Actual Actual +/- (µg/mL) OSHA PEL (TWA)

Expanded

071123

Uncertainty (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 SRM NIST

m/z->	1.005	m/z-> 2.0E5	2.5E5	5.0E5	1000	2000
0		110		0		
N N O		120		20		
230		130		<b>3</b> 0		
24		140		40		
250		150		50		
260		190		8		
		170		70		
		180		8.		
		190		90		
		200		100		

Part # 57116

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

	BE BE BE
	40.02 40.02 40.02 40.02
	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
•	594445
	40.22 40.22 40.22 40.22
	<b>≥ 유요요 프 무 ▽</b>
	40.02 40.02 40.02 40.02 40.02
	8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
	40,02 40,02 40,02 40,02 40,02 40,02
	Li Li Mg Mn Hg
(T)= Tarnet analyte	Verifica
onak.	K P P B S S N
5	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	S S S S S S S S S S S S S S S S S S S
	(µg/mL)
	Ta Sr Na Se
	40.22 40.02 40.02 40.02 40.02 7 7 40.02
	To T
	60000000000000000000000000000000000000
	Z
	666666666666666666666666666666666666666

Physical Characterization:

(1)= larger analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. the preparation of all standards.
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- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
  \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Part # 57116

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

109/24

Solvent: 24002546 Nitric Acid

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT: M.5818

Part Number: Lot Number: Description: 57014 122023 Silicon (SI)

**Expiration Date:** 122026

2%

Nitric Acid

Formulated By:

Aleah O'Brady

122023

Areah o Brasky

Reviewed By:

Pedro L. Rentas

122023

SRM

<u>E</u> 40.0

Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: 6UTB 1000 Ambient (20 °C)

Weight shown below was diluted to (mL): 1999.48 5E-05 Balance Uncertainty

0.058 Flask Uncertainty

	11 -
Ammonium hexafluorosilicate (Si)	Compound
10009 :	RM#
SID082022A1	Lot
IN009 SID082022A1 1000 99.999 0.10 14.4 13.8854 13.8855	Lot Nominal Purity Uncertainty Assay Number Conc. (µg/mL) (%) Purity (%) (%) W
99.999	Purity (%)
0.10	Uncertainty Purity (%)
14.4	Assay (%)
13.8854	Target Weight (g)
13.8855	Actual Weight (g)
1000.0	Actual Conc. (µg/mL)
2.0	Expanded Uncertainty +/- (µg/mL)
16919-19-0	(Solven
1000.0 2.0 16919-19-0 2.5 mg/m3	Expanded  Actual Uncertainty (Solvent Safety Info. On Attached pg.)  Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50
orl-mus 70 mg/kg	on Attached pg.)

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Part # 57014

Lot # 122023



# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(T) = Target analyte

## **Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com



Certified Reference Material CRM

2 02/na

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Solvent: 24002546

Nitric Acid

F Lot #

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT

Part Number: Lot Number: 58030

Description:

111623 Zinc (Zn)

Ambient (20 °C) 111626

**Expiration Date:** 

Nominal Concentration (µg/mL): Recommended Storage:

**NIST Test Number:** 

**BTU9** 1000

5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Weight shown below was diluted to (mL):

3000.4

5

Nominal

Purity

Uncertainty Assay

Target

Actual

Actual

Uncertainty

Expanded

<u>%</u> 60.0 <u>a</u>

Nitric Acid

Formulated By: Benson Chan

111623

Reviewed By: Pedro L. Rentas

111623

Zinc nitrate hexahydrate (Zn) Compound [1] Spectrum No.1 [ 31.103 sec]:58130.D# [Count] [Linear] IN016 ZNE032021A1 RM# Number Conc. (µg/ml.) 1 000 99.999 8 Purity (%) 0.10 24.3 3 Weight (g) 12.3475 Weight (g) Conc. (µg/ml.) 12.3502 1000.2 +/- (µg/mL) 2.0 10196-18-6 CAS# OSHA PEL (TWA) orl-rat 1190mg/kg 3168



(Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 **SDS** Information SRM SRM

200

100

Part # 58030

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(I) = larget analyte

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<sup>\*</sup> Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



# Certified Reference Material CRM

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT: Lot #

Part Number: Lot Number: Description: 57015 091123 Phosphorous (P) Solvent: 24002546 2% 40.0 Nitric Acid Nitric Acid

Formulated By:

Lawrence Barry

091123

Pedro L. Rentas

091123

**SDS** information

rento

Nominal Concentration (µg/mL): Recommended Storage: **Expiration Date:** 1000 091126 Ambient (20 °C) (JE)

Weight shown below was diluted to (mL): **NIST Test Number:** BITUB Lot 2000.02 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Uncertainty Reviewed By: Expanded

 Ammonium dihydrogen phosphate (P) IN008 Pvos2018A1 [1] Spectrum No.1 RM# Number [ 12.074 sec]:58115.D# [Count] [Linear] Conc. (µg/mL) 1000 99.999 3 Purity (%) 0.10 27.5 3 Weight (g) 7.2729 Weight (g) Conc. (µg/mL) 7.2730 1000.0 +/- (µg/mL) 2.0 7722-76-1 CAS# (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 5 mg/m3 rl-rat >2000mg/ki 3186 SRM

Part # 57015

--z/m

210

220

230

240

250

260



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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Sodium Chloride, Crystal BAKER ANALYZED® A.C.S. Reagent







Material No.: 3624-01

Batch No.: 0000281938

Manufactured Date: 2021-06-07

Retest Date: 2026-06-07

Revision No.: 1

### **Certificate of Analysis**

Test	Specification	Result
Assay (NaCl) (by Ag titrn)	≥ 99.0 %	100.0 %
pH of 5% Solution at 25°C	5.0 - 9.0	6.3
Insoluble Matter	≤ 0.005 %	0.003 %
lodide (I)	≤ 0.002 %	< 0.002 %
Bromide (Br)	≤ 0.01 %	< 0.01 %
Chlorate and Nitrate (as NO <sub>3</sub> )	≤ 0.003 %	< 0.001 %
ACS - Phosphate (PO <sub>4</sub> )	≤ 5 ppm	< 5 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.004 %	< 0.004 %
Barium (Ba)	Passes Test	Passes Test
ACS - Heavy Metals (as Pb)	≤ 5 ppm	< 5 ppm
ron (Fe)	≤ 2 ppm	< 1 ppm
Calcium (Ca)	≤ 0.002 %	< 0.001 %
Magnesium (Mg)	≤ 0.001 %	< 0.001 %
Potassium (K)	≤ 0.005 %	0.001 %

For Laboratory, Research, or Manufacturing Use Meets Reagent Specifications for testing USP/NF monographs Country of Origin: USA

Packaging Site: Paris Mfg Ctr & DC





### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: Inorganic ICV Solutions

### QATS LABORATORY INORGANIC REFERENCE MATERIAL INITIAL CALIBRATION VERIFICATION SOLUTIONS (ICV1, ICV5, AND ICV6)

These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

APPLICATION:

For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** 

Read instructions carefully before opening bottle(s) and proceeding with

the analyses.

Contains Metals in Dilute Acidic or Cyanide in Basic Aqueous Solutions HAZARDOUS MATERIAL

> Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more Aqueous Inorganic Reference Materials containing various analyte concentrations. ICV1 and ICV5 are in a matrix of dilute nitric acid. ICV6 is in a matrix of dilute basic solution. For the reference material source in reporting ICVs use "USEPA". For the reference material lot number for the ICV1, ICV5, and ICV6 solutions use "ICV1-1014", "ICV5-0415", and "ICV6-0400", respectively.

### (B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided

> QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY **APTIM Federal Services, LLC** 2700 Chandler Avenue - Building C Las Vegas, NV 89120

### (C) ANALYSIS OF SAMPLES

The Initial Calibration Verification Solutions (ICVs) are to be used to evaluate the accuracy of the initial calibrations of ICP, AA, and Cyanide colorimetric instruments, and are to be used with the CLP SOWs and revisions. The values for each element in the ICVs are listed below in µg/L (ppb) for the resulting solution(s) after the dilution of the concentrate(s) according to the following instructions. Use Class 'A' glassware to prepare the solution(s).

ICV1-1014

For ICP-AES analysis, use a 10-fold dilution by pipetting 10 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric

Page 1 of 2









### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

### Instructions for QATS Reference Material: Inorganic ICV Solutions

ICV1-1014

For ICP-MS analysis, use a 50-fold dilution by pipetting 2 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 1% (v/v) nitric acid.

ICV5-0415

For the cold vapor analysis of mercury by AA, use a 100-fold dilution by pipetting 1 mL of the ICV5 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid. The ICV5 concentrate is prepared in 0.05% (w/v) K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> and 5% (v/v) nitric acid.

ICV6-0400

For the analysis of cyanide, use a 100-fold dilution by pipetting 1 mL of the ICV6 concentrate into a 100 mL volumetric flask and dilute to volume with Type II water. Distill this solution along with the samples before analysis. The cyanide concentrate is prepared from K₃Fe(CN)₅, Type II water, and 0.1 % sodium hydroxide, and will decompose rapidly if exposed to light.

NOTE: USE TYPE II WATER AND HIGH-PURITY ACIDS FOR ALL DILUTIONS.

### (D) CERTIFIED CONCENTRATIONS OF QATS ICV1, ICV5, AND ICV6 SOLUTIONS

	ICV1-1014	
Element	Concentration (µg/L) (after 10-fold dilution)	Concentration (µg/L)
Al	2500	(after 50-fold dilution
Sb	1000	500
As	1000	200
Ba	520	200
Be	510	100
Cd	510	100
Ca	10000	100
Cr	520	2000
Co		100
Cu	520	100
Fe	510	100
Pb	10000	2000
Mg	1000	200
Mn	6000	1200
Ni	520	100
K	530	110
Se	9900	2000
Ag	1000	200
Na	250	50
TI	10000	2000
V	1000	210
Zn	500	100
	1000	200

	ICV5-0415	ICV6-0400					
Element	Concentration (µg/L) (after 100-fold dilution)	Analyte	Concentration (µg/L) (after 100-fold dilution				
Hg	4.0	CN-	99				

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# Certified Reference Material CRM

M5962 R! 06/14/24



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

m/z->		i,	m/z->		10 c	÷ is	1. Selenium (Se)	Compound		<		Nominal Co	Re			CERTIFIED WEIGHT REPORT	מדודודה שובום
210	1.008	2.008	110	1.008	/z-> 10	[1] Spectrum No.1				Volume shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	1	Lot Number: Description:	Part Number:	1 11000H
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220			120		N 0	r.	071223	Number	Lot	d to (mL):	6UTB	1000	Ambient (20 °C)		060624 Selenium (Se)	57034	
Ŋ			4		ω	3.702	0.1000	Factor	Dilution	2000.07			<u>೦</u>		Se)		
230			130		90	sec]:58	200.0	Val. (mL	Initial	0.100	5E-05						
240			140		40	33.702 sec]:58034.D# [Count] [Linear]	0.084	Vol. (mL) Pipette (mL) Conc. (µg/mL)	Uncertainty	Flask Uncertainty	Balance Uncertainty						
250			150		50	Count) [L	1000	Conc. (µg/mL)	Nominal	ťγ	ainty			2.0%	24007540	24002546	
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0							1000.0	Conc. (µg/mL) Conc. (µg/mL)	Final					Nitric Acid			(1)
			170		70		2.2	.) +/- (µg/mL)	Uncertainty	Expanded	Reviewed By:	K	N	Formulated By:	M		10
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			190		90		2 0.2 mg/m3	OSHA PEL (TWA)	(Solvent Safety Info. On Attached pg.)	SDS Information	Pedro L. Rentas	lenco		Benson Chan	M		
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			-		J		orl-rat 6700 mg/kg	LDS0	ched pg.)		060624			060624			
							3149	SRM	NIST		4			4-1		_	

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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Ве	40.01	ť	40.02	Ga	<0.02	F	<0.2	Hg	A02	P	<0.02	Ru	40.02	Sr	<0.02	Tm	<0.02	¥	<0.02
Bi	40.02	င္ပ	<0.02	ଦ୍ଧ	<0.02	Ľ	<0.02	Mo	<0.02	7	<0.02	Sm	40.02	S	<0.02	Sn	40.02	Zn	<0.02
В	<0.02	Cι	<0.02	Au	<0.02	Рь	<0.02	M	<0.02	×	40.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Z	<0.02

(T) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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  \* Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

CERTIFIED WEIGHT REPORT:
Part Number:
Lot Number: Lithium nitrate (Li) Nominal Concentration (µg/mL): m/z-> Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date** [1] Spectrum No.1 [ 32.093 sec]:58003.D# [Count] [Linear] Description: 210 10 Part Lot Number Number 58103 070622 0.1000 57003 062124 Lithium (Li) 6UTB 062127 Ambient (20 °C) 1000 220 120 20 250.11 230 25.0 0.004 Initial Uncertainty Nominal Initial Final

Vol. (mL) Pipette (ml.) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) 0.016 Flask Uncertainty 5E-05 Balance Uncertainty HEBSON OF PSON 240 40 1000 24002546 Lot# 2.0% 250 150 50 Nitric Acid Solvent: 10000.4 (mL) 260 1000.0 Nitric Acid 7/01/24 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Giovannie Capacito 2.0 7790-69-4 5 mg/m3 orl-rat 1426 mg/kg NA SDS Information
(Solvent Safety Info. On Attached pg.)
CAS# OSHA PEL (TWA) LD50 Pedro L. Rentas Giovanni Esposito 9 0 062124 062124 SRM

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

**\$** 

Certified Reference Material CRM

20

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Part # 57003 Lot # 062124

1 of 2

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### Certified Reference Material CRM



ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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E	2 1	7 -	< ?	∳.	<	d	W			
20,02	20.02	40.02	20.00	3 8	20.02	<0.02	<0.02			

(T) = Target analyte

### Physical Characterization:

Al Sh As Ba Ba Bi

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

	Puri	굺
	Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in	certifi
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the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* All standards on prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are prepared gravimetrically using balances that are calibrated.

\* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

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Part # 57003 Lot # 062124

Printed: 6/24/2024, 11:20:08 PM

2 of 2

### Certificate of Analysis 6652M , 8782M

MORGANIC NE NE SE SEGENE YOU TREST

info@inorganicventures.com P: 800-669-6799/540-585-3030 P: 540-585-3030 R:2/22/24

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com



### ACCREDITATION / REGISTRATION

Number QSR-1034). the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (GSR Certificate INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for

### PRODUCT DESCRIPTION

Catalog Number:

Single Analyte Custom Grade Solution Product Code:

CGTN

2% (v/v) HNO3 :xintsM T2-TI719972 Lot Number:

muineill 1 000 hg/mL ea: Value / Analyte(s): tr. HF

Starting Material Lot#: 2094 Starting Material: Ti Metal

Starting Material Purity: 99.9975%

1002 ± 5 µg/mL Certified Value: **CERTIFIED VALUES AND UNCERTAINTIES** 

1.012 g/mL (measured at 20  $\pm$  4 °C) Density:

Assay Information:

ICP Assay NIST SRM 3162a Lot Number: 130925 1002 ± 4 µg/mL Assay Method #1

The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance  $\frac{1}{1000}$ 

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mosn of individual results:

 $(x_0) \ (x_0) \ (x_0$ 

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expressed at approximately the 95% confidence level using a coverage factor of  $K=\Sigma$ .

Characterization of CRM/RM by One Method Characterization of CRM/RM by Two or More Methods

4.0 TRACEABILITY TO NIST

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration

### 4.2 Balance Calibration

used for testing are annually compared to master weights and are traceable to NIST. - All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRWIRMs.

CRM/RMs are tested for trace metallic impurities by Axial ICP-DES and ICP-MS. The result from the most sensitive method for each element, is reported below, solutions tested by ICP-MS were analyzed in an III bA-Bitter of ore each element, is reported below, solutions tested by ICP-MS were analyzed in an III bA-Bitter of the property of the property

e2 M 078220.0 > gN O 882000.0 > u3 M 8g < 0.000536 M Eu <

### ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to

Page 2 of 4

INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

> uR M 882000.0

> 9A M 886 0.000.0

> bq M 882000.0 > rq M 888200.0 > rq M 682000.0 > dg M 271100.0

> q O f81200.0 > dq M f82800.0

> iN O 882000.0 > aO M 841200.0

> dN O 322500.0 > N M 862000.0

M - Checked by ICP-MS

Mn < Mg < Li <

> 0H

> 6H

ΉŁ

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

M 976800.0 > 8 | 34500.0 M 576800.0 > 8 M 782600.0

by ICP-MS O - Checked by ICP-OES i - Spectral Interference n - Not Checked For s - Solution Standard Element

> mT M 882000.0 > U M 882000.0 > V M 682000.0 W M

> 6T M 882000.0 > AT M 882000.0

sT M 034450.0 > dT M E70100.0

s 852000.0 M 882000.0

O.000269 O

O.043560 O

n2 M 068010.0 89Z000.0 > mS M 89Z000.0

> II

JS

674000.0 228610.0

892000.0 892000.0

0.000268

699630.0

0.001341

892000.0

0.010560

960000'0

960000.0

73260.0 > nZ O 402100.0 038540.0 > nZ O 267400.0

### 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (µg/ml)

7.7 Storage and Handling Recommendations

oM M 882000.0

0.000268 M K 0.000268 M K 0.000268 M K

0.000872 O Fe > 0.008586 M Ga <

O 892000.0

O S37000.0 M 882000.0

M 882000.0

M 603100.0

M 885800.0

M £83200.0 > 00 M GG8020 O.004577 M Gd <

INTENDED USE

W Et < O Cn <

O B <

IA O

### 4.1 Thermometer Calibration

volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is - This product is traceable to MIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRMINM uncertainty error and the measurement, weighing and

### Page 3 of 4

- Chemical Testing - Accredited / AZLA Certificate Number 863.01

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- QSR Certificate Number QSR-1034

1.01 ISO 9001 Qualify Management System Registration

### MOITATY STANDARD DOCUMENTATION 0.01

Homogeneity data indicate that the end user should take a minimum ample size of 0.0.2 m L to assume

This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. The Coth series alongs mirror and the constant and the country of the Coth series alongs mirror and the country of the Coth series alongs mirror and the country of the coth series alongs and the country of the coth series along the c

### HOMOGENEITY

Please refer to the Safety Data Sheet for information regarding this CRWRM.

### NOITAMROANI SUOGRASAH HF Note: This standard should not be prepared or stored in glass.

Ollinger		C INTOTINATION (ICP_OEC n.	Idoseones	
ss radial/axial view):	are given	Estimated D.L. Estimated D.L.	Technique/Line	
Interferences (Underline 11 )	Order	idq 41	ICP-MS 48 amu	
Interferences (underlined indicates severe) 32S16O, 32S14N,	A/N	add		
14N160180,				
14N17N2, 36Ar12C,				
48Ca, [96X=2				
7-Vool (no o				
(where X = Zr, Mo, Ru)]		10000 () 1900 ()	ICP-OES 323.452 nm	
Ce, Ar, Ni		Jm/gu Se000.0 \ +200.0	ICP-0ES 334.941 nm	
		m/pu 820000.0 \ 8500.0	ICP-0ES 336.121 nm	
ла, Та, Сг, U М М9 Ω-	1 1		Mote: This start and F	II-
W, Mo, Co		In/gy 4500000 \ cocos-	nous prepries entre shou	•

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/a

1:1:1 H2O / HF./ H2SO4 or fuse ash with pyrosulfate if oxide is as plastic pigment and likely in brookite Volentily), Oxide - Northere are repetation; and sociation; restore (Dissolved by heating in 1737 HZO / HF / HZSO4); Oxide - Northere history (~800EC) brooklie (fuse in Pt0 with KZSZO7); Ores (fuse in Pt0 with KZZZO7); Ores (fuse in Pt0 with provide it as plastic pigment and likely in brooktie (fuse in Pt0 with provide it as plastic pigment and likely in brooktie TI Containing Samples (Preparation and Solution) - Metal (Soluble in HZO / HF caution -powder reacts

HNO3 / LDPE container. 1-10,000 ppm single element solutions as the Ti(F)6-2 chemically stable for years in 2-5% HNO3 / trace HF in an LDPE container. with a fendency to hydrolyze forming the hydrated oxide in all dilute acids except HE.

Stability - 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)6-2 for months in 1%

HNO3 / LDPE container. 1-10.000 ppm sincle element solutions as the Ti(F)8-2 chemically stable for year media. Unstable at ppm levels with metals that would pull F-away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming the hydrafed oxide in all dilute adds except HF. Chemical Compatibility - Soluble in concentrated HCI, HF, H3PO4 H2SO4 and HNO3. Avoid neutral to basic Atomic Weight, Valence; Coordination Number; Chemical Form in Solution - 47.87 +4 6 Ti(F)6-2

- For more information, visit www.inorganicventures.com/TCT

reported density. Do not pipette from the container. Do not refurn removed aliquots to container. - After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$  -  $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the renorded density. Do not biselfe from the container. Do not return removed alticular to container.

Twitte sociate in the secied 101 beg, trainspleaded for the orderiver in the shalfy concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss. - While stored in the sealed TCT bag, transpiration of this CRWRM is negligible. After opening the sealed TCT bag, transpiration in a negligible in the capture managed in the capture

- Store between approximately  $4^{\circ}$  - 30° C while in sealed TCT bag.

Page 4 of 4

Chairman / Senior Technical Director

- Sealed TCT Bag Open Date:

NAMES AND SIGNATURES OF CERTIFYING OFFICERS

- The date after which this CRM/RM should not be used.

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

norganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.859.5790; 540.855.3030, Fax: 540.555.3012; Inorga - Reference Material Producer - Accredited / A2LA Certificate Number 883.02 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- This CRMRM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRMRM being stored and handled in accordance with the instructions given in Sec. 7.1.

stability studies conducted on properly stored and handled CRWRMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability. - The lot expiration date reflects the period of time that the stability of a CRMRM can be supported by long term

- The certification is valid within the measurement uncertainty specified provided the CRWRM is stored and handled in accordance with instructions given in  $Sec\ 7.1$ . This certification is nullified if instructions in  $Sec\ 7.1$  are not followed or if the CRWRM is damaged, confaminated, or otherwise modified.

Thomas Kozikowski Manager, Quality Control Certificate Approved By:

thibils Validity

- June 17, 2027 11.2 Lot Expiration Date

June 17, 2022 11.1 Certification Issue Date

Paul Gaines Certifying Officer:

0.Sr

0.11

CERTIFIED WEIGHT REPORT:

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com



# Certified Reference Mater



fied Refe	rence Mai	fied Reference Material CRM	C		ANAB IS AR-153 https://ab	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	dited
¥	Z #107	7	2	2/11/0	<b>&gt;</b>		
Solvent:	Solvent: 24002546 Nitric Acid	Nitric Acid		A CONTRACTOR OF THE PARTY OF TH			
2%	40.0	Nitric Acid		Formulated By:	Benson Chan	031524	
	(III)			M	Hento		
Uncertainty				Reviewed By:	Pedro L. Rentas	031524	

Part Number: Lot Number:		19		Solvei	Solvent: 24002546 Nitric Acid	46 Nitr	ic Acid		A STATE OF THE STA	1		
Description:	Strontium (Sr)	(Sr)		C)	2% 40.0		Nitric Acid	, Itt	Formulated Bv:	Benson Chan	8	031524
Expiration Date:	031527							I	7	1		
Recommended Storage:	Ambient (20 °C)	(2)							1	A Comment of the Comm	1	
Nominal Concentration (µg/mL):	1000								June 1	Kena	΄ Δ	
NIST Test Number:	6UTB		5E-05 Ba	5E-05 Balance Uncertainty	<u>~</u>			Œ	Reviewed By:	Pedro L. Rentas		031524
Weight shown below was diluted to (mL); 2000.07	as diluted to (mL):	2000.07	0.100 Fla	0.100 Flask Uncertainty				I				
									Expanded	SDS Information	mation	
	Lot	Nominal	Purity U	Nominal Purity Uncertainty Assay	say Target		Actual Act	Actual U	Uncertainty	(Solvent Safety Info. On Attached pg.)	On Attached pg.)	TSIN
Compound	RM# Number Conc. (µg/mL) (%) Purity (%) (%)	Conc. (ug/mL)	(%)	urity (%) (9	6) Weight (g)		Weight (g) Conc. (µg/mL) +/- (µg/mL)	ug/mL) +	-/- (ug/mL) CAS#	# OSHA PEL (TWA)	NA) LD50	SRM

1. Strontium nitrate (Sr)		IN017 SRZ022018A1	1000	89.997	0.10	41.2	4.85470	4.85502	1000.1	2.0	10042-76-9	NA	orl-rat >2000mg/kg 3153a
5.0EG	[1] Spect	[1] Spectrum No.1	[ 14.495 sec]:58138.D# [Count] [Linear]	sec]:581	38.D#	Coun	nt] [Linea						
2.5E6												-90-000 Market	
m/z->⊶ 1.0E6	•	10 20		OG	0		.00	09	0,		80	. <u>0</u>	100
5.0ES	unggap a miking kilanggap kila ungkar sikan ke												
m/z-≫ 5.0E6		110 120		130	041		150	160	0.71		180	081	200
2.5E6													
V-z/H	4	210 220		230	240	14	250	260					



Absolute Standards, Inc.

www.absolutestandards.com

800-368-1131



# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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	THE RESERVE THE PERSON NAMED IN	<0.02	<0.02	<0.02	2002	<b>40.02</b>	200	200
	DESCRIPTION OF	9	Te	E	É	Į,	5	Ë
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		Se	Si	Ag	Z	Š	<b>V</b>	Ę
(Jm/br/		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	₹0.02
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by ICP-I	Married Scin	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	40.5
ition		ž	ź	ő	몺	Д	ፈ	M
Verifica	New Contraction of the	<0.02	<0.02	<0.01	<0.02	<0.2	<0.02	<0.02
stals		3	5	Mg	Mn	Hg	Wo	ğ
race Me		<0.02	<0.02	<0.02	<0.02	40.2	<0.02	<0.02
-		Hŧ	Ho	描	긔	Æ	2	윤
		<0.02	<0.02	<0.02	<0.02	₹0.05	<b>40.02</b>	<0.02
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	WE SHAME	ਲ	రి	ඊ	ర	ڻ	රි	ਹੋ
	NAME OF STREET	<0.02	<0.02	<0.2	<0.02	<0.01	<0.02	<0.02
	Market Market	₹	Sp	As	Ba	æ	B.	В

(T) = Target analyte

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.



Certified by:

Lot # 031524

1. P

1 \*

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

<sup>\*</sup> All Standards should be stored with caps tight and under appropriate laboratory conditions.
\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

### M5984 R:6/14/24

P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

**Product Code:** 

Single Analyte Custom Grade Solution

Catalog Number:

CGY10

Lot Number:

V2-Y740548

Matrix:

2% (v/v) HNO3

Value / Analyte(s):

10 000 μg/mL ea:

Yttrium

Starting Material:

Yttrium Oxide

Starting Material Lot#:

2661 and 06230520YL

Starting Material Purity:

99.9984%

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 

10000 ± 30 µg/mL

Density:

1.032 g/mL (measured at 20  $\pm$  4 °C)

### **Assay Information:**

Assay Method #1

10011 ± 25 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #2

9997 ± 50 µg/mL

ICP Assay NIST SRM 3167a Lot Number: 190730

Assay Method #3

9984 ± 31 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

 The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

### $X_{CRM/RM} = \Sigma(w_i) (X_i)$

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of

 $w_i = (1/u_{char})^2 / (\Sigma(1/(u_{char})^2))$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$  where  $u_{char}$  are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

Characterization of CRM/RM by One Method

is used is the mean of individual results:

X<sub>a</sub> = mean of Assay Method A with

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

XCRM/RM = (Xa) (uchar a)

k = coverage factor = 2

uchar a = the errors from characterization

uts = transport stability standard uncertainty

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization

ucher a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (2) =  $U_{CRM/RM} = k (u^2_{chara} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.004600	М	Eu		0.009037	M	Na		0.086360	M	Se	<	0.005200	M	Zn		0.030125
M	A!		0.014862	0	Fe		0.002410	М	Nb	<	0.000570	0	Si		0.024100	0	Zr	<	0.002600
M	As	<	0.003500	M	Ga	<	0.000570	М	Nd		0.000923	M	Sm		0.000461				
M	Au	<	0.001700	M	Gd	<	0.003500	М	Ni	<	0.005700	M	Sn	<	0.002300				
0	В		0.002209	M	Ge	<	0.005200	М	Os	<	0.001200	M	Sr	<	0.004600				
0	Ba	<	0.002500	М	Hf	<	0.000570	n	Р	<		M	Ta	<	0.000570				
0	Ве	<	0.001400	M	Hg	<	0.000570	M	Pb		0.005020	M	Τb		0.001044				
М	Bi	<	0.003500	M	Но		0.009037	M	Pd	<	0.005100	М	Te	<	0.002300				
0	Ca		0.009841	M	In	<	0.002300	M	Pr	<	0.002300	М	Th	<	0.000570				
M	Cd	<	0.000570	М	Ir	<	0.000570	М	Pt	<	0.000570	М	Ti	<	0.003500				
М	Ce	<	0.002300	0	K		0.018677	М	Rb	<	0.000570	М	TI	<	0.000570				
М	Co	<	0.000570	М	La		0.000461	М	Re	<	0.000570	М	Tm	<	0.003500				
М	Cr	<	0.004000	0	Li	<	0.009300	M	Rh	<	0.008000	М	U	<	0.000570				
M	Cs	<	0.000570	М	Lu		0.000582	M	Ru	<	0.000570	М	٧		0.001265				
М	Cu		0.002610	0	Mg		0.001486	n	S	<		М	W	<	0.002300				
М	Dy		0.003815	М	Mn		0.000582	М	Sb		0.005422	s	Υ	<					
М	Er		0.003615	М	Мо	<	0.005700	М	Sc	<	0.001200	М	Yb		0.001827				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference n - Not Checked For s - Solution Standard Element

### 6.0 **INTENDED USE**

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale.

https://www.inorganicventures.com/terms-and-conditions-sale. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 88.91 +3 6 Y(OH)(H2O)x+2 Chemical Compatibility -Soluble in HCl, H2SO4 and HNO3. Avoid HF, H3PO4 and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride. Avoid mixing with elements / solutions containing moderate amounts of fluoride.

Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions

chemically stable for years in 2-5% HNO3 / LDPE container.

Y Containing Samples (Preparation and Solution) - Metal (Soluble in acids); Oxide (Dissolve by heating in

H2O/ HNO3); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1 H2O / HCl or HNO3).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 89 amu	0.8 ppt	N/A	73Ge16O, 178Hf+2
ICP-OES 360.073 nm	0.005 / 0.000036 µg/mL	1	Ce, Th
ICP-OES 371.030 nm	0.004 / 0.00007 µg/mL	1	Ce
ICP-OES 377.433 nm	0.005 / 0.0009 μg/mL	1	Ta, Th

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.565.3012; inorganicventures.com;

### 11.0 **CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY**

### 11.1 Certification Issue Date

February 20, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- February 20, 2029
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date:	
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- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 **NAMES AND SIGNATURES OF CERTIFYING OFFICERS**

Certificate Prepared By:

Uyen Truong **Custom Processing Supervisor**  Mayor May

### **Certificate Approved By:**

Muzzammii Khan Stock Laboratory Supervisor

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

### M5985 R:6/14/24

P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code:

Single Analyte Custom Grade Solution

Catalog Number:

CGIN10

Lot Number:

U2-IN729349

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

10 000 μg/mL ea:

Indium

Starting Material:

Indium Metal

Starting Material Lot#:

2511

Starting Material Purity:

99.9995%

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 

 $10022 \pm 30 \mu g/mL$ 

Density:

1.044 g/mL (measured at 20 ± 4 °C)

### **Assay Information:**

Assay Method #1

10021 ± 56 µg/mL

ICP Assay NIST SRM 3124a Lot Number: 110516

Assay Method #2

10035 ± 25 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #3

10001 ± 33 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

### $X_{CRM/RM} = \Sigma(w_i) (X_i)$

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of

 $w_i = (1/u_{char\ i})^2 / (\Sigma (1/(u_{char\ i})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$  where  $u_{char}$  i are the errors from each characterization method

ubb = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Certified Value,  $X_{\text{CRM/RM}}$ , where one method of characterization is used is the mean of individual results:

Characterization of CRM/RM by One Method

 $X_{CRM/RM} = (X_n) (u_{char})$ 

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{chara} + u^2_{bb} + u^2_{lts} + u^2_{ls}\right)^{1/2}$ 

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

М	Ag	<	0.000760	М	Eu	<	0.000760	0	Na		0.012771	M	Se	<	0.023000	М	Zn	<	0.006100
М	Al		0.003385	0	Fe		0.004462	М	Nb	<	0.000760	0	Si		0.024619	М	Zr	<	0.000760
М	As	<	0.004600	М	Ga	<	0.000760	М	Nd	<	0.000760	М	Sm	<	0.000760				
М	Au	<	0.002300	М	Gd	<	0.000760	0	Ni	<	0.005100	М	Sn	<	0.000760				
0	В		0.003692	М	Ge	<	0.001600	M	Os	<	0.000760	0	Sr	<	0.000610				
М	Ba	<	0.001600	M	Hf	<	0.000760	n	Р	<		М	Ta	<	0.000760				
0	Be	<	0.000130	M	Hg	<	0.003100	M	Pb		0.001400	М	Tb	<	0.000760				
M	Bi	<	0.000760	М	Но	<	0.000760	М	Pd	<	0.001600	М	Te	<	0.000760				
0	Ca		0.004616	8	In	<		М	Pr	<	0.000760	М	Th	<	0.000760				
M	Cd	<	0.000760	М	lr	<	0.000760	M	Pt	<	0.000760	0	π	<	0.001100				
М	Ce	<	0.000760	0	K		0.007078	М	Rb	<	0.000760	М	TI	<	0.000760				
М	Co	<	0.000760	М	La	<	0.000760	М	Re	<	0.000760	М	Tm	<	0.000760				
0	Сг	<	0.001300	0	Li	<	0.000130	М	Rh	<	0.000760	М	U	<	0.000760				
М	Cs	<	0.000760	M	Lu	<	0.000760	М	Ru	<	0.000760	М	٧	<	0.001600				
М	Cu	<	0.003800	0	Mg		0.000707	n	S	<		М	W	<	0.001600				
М	Dy	<	0.000760	0	Mn		0.000149	M	Sb	<	0.000760	М	Υ	<	0.000760				
М	Er	<	0.000760	М	Мо	<	0.002300	М	Sc	<	0.000760	M	Yb	<	0.000760				

n - Not Checked For s - Solution Standard Element

M - Checked by ICP-MS O - Checked by ICP-OES

i - Spectral Interference

### **INTENDED USE** 6.0

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

**6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures <u>Terms and Conditions of Sale.</u> <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 114.82 +3 6 In(H2O)6+3 Chemical Compatibility -Soluble in HCl, HNO3, and H2SO4. Avoid neutral and basic media. Stable with most metals and inorganic anions. The oxalate, sulfide, carbonate, hydroxide and phosphate are insoluble in water.

Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO3 / LDPE container.

In Containing Samples (Preparation and Solution) -Metal (Best dissolved in HCl / HNO3); Oxide (Soluble in mineral acids); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Sulfuric/peroxide digestion or dry ash and dissolution in dilute HCl).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line Estimated D.L.		Order	Interferences (underlined indicates severe)
ICP-MS 115 amu	1 ppt	n/a	115Sn, 99Ru16O
ICP-OES 158.583 nm	0.05 / 0.002 μg/mL	1	
ICP-OES 230.606 nm	0.1 / 0.03 μg/mL	1	Ni, Os
ICP-OES 325.609 nm	0.2 / 0.05 μg/mL	1	Mn, Mo, Th

### 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; Inorganicventures.com; Info@inorganicventures.com

### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

February 21, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- February 21, 2028
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

One led TOT Day On	an Datas	
- Sealed TCT Bag Or	pen Date:	

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director

20178hi

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

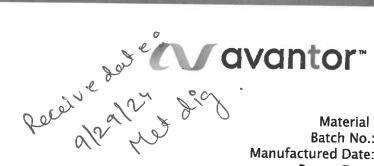


### R; 01/03/24 M6033 Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

m/z->	1.006	2.016	m/z->	N O	5.0E6	m/z->	1.1.1.	2.5E5	6-6	5.0E5	Aluminum nitrate nonahydrate (Al)	Compound	Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Fyniret	Des	Fan Lot	CERTIFIED WEIGHT REPORT:
210			110			10				[1] Spectrum No.1	11	RM#	below was dilut	Number:	(µg/mL):	Storage:	Evniration Data:	Description:	Fart Number:	
220			120			20				_	IN022 ALM112021A1	Lot Number Co		6UTB	10000	Ambient (20 °C)	011636	Aluminum (Al)	011623	)
230			130			30				5.014 sec]:	10000 99.999	Nominal Purity Conc. (µg/mL) (%)	2000.02 0.05	5E-0		<u>.</u>				
240			140			40				15.014 sec]:58113.D# [Count] [Linear]	9 0.10 7.30	Purity Uncertainty Assay (%) Purity (%) (%)	0.058 Flask Uncertainty	5E-05 Balance Uncertainty			2%		Solvent:	<b>&gt;</b>
250			150			50				Count] [Line	0 273.9779	ay Target ) Weight (g)		<b>y</b>		(1117)			it: 20510011	
260			160			60				»ar]	274.0078 1	Actual Weight (g) Con					Nitric Acid		Nitric Acid	
			170			70					10001.1 2	Actual Unce Conc. (µg/mL) +/- (		Revi			Form	7	~e	7
			180			80					20.0 7784-27-2	Expanded (Si Uncertainty (Si +/- (µg/mL) CAS#		Reviewed By:	tach		Formulated By:	200 A contract	L'internation of	
			190			90					2 mg/m3	SUS Information Support Safety Info. On Attacon OSHA PEL (TWA)		Pedro L. Rentas	pena		Giovanni Esposito	(	7	
			200			100						Attached		38	8		sito		e de	
											orl-rat 3671 mg/kg 3101a	pg.) NIST LD50 SRM		011623			011623			

Hydrochloric Acid, 36.5-38.0% BAKER INSTRA-ANALYZED® Reagent For Trace Metal Analysis





Material No.: 9530-33

Batch No.: 22F0762009 Manufactured Date: 2022-05-10

Retest Date: 2027-05-09

Revision No.: 0

### Certificate of Analysis

	Specification	Result		
ssay (as HCI) (by acid-base titrn)	36.5 - 38.0 %	37.6 %		
olor (APHA)	≤ 10	5		
esidue after Ignition	≤ 3 ppm	< 1 ppm		
pecific Gravity at 60°/60°F	1.185 - 1.192	1.190		
omide (Br)	≤ 0.005 %	< 0.005 %		
tractable Organic Substances	≤ 5 ppm	< 1 ppm		
ee Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm		
te (PO <sub>4</sub> )	≤ 0.05 ppm	< 0.03 ppm		
O(4)	≤ 0.5 ppm	< 0.3 ppm		
O <sub>3</sub> )	≤ 0.8 ppm	0.3 ppm		
ım (NH4)	≤ 3 ppm	< 1 ppm		
ourities – Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm		
ourities – Aluminum (Al)	≤ 10.0 ppb	0.8 ppb		
nd Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb		
purities – Barium (Ba)	≤ 1.0 ppb	< 0.2 ppb		
ourities – Beryllium (Be)	≤ 1.0 ppb	< 0.2 ppb		
urities – Bismuth (Bi)	≤ 10.0 ppb	< 1.0 ppb		
urities - Boron (B)	≤ 20.0 ppb	< 5.0 ppb		
urities – Cadmium (Cd)	≤ 1.0 ppb	< 0.3 ppb		
urities - Calcium (Ca)	≤ 50.0 ppb	14.9 ppb		
urities – Chromium (Cr)	≤ 1.0 ppb	< 0.4 ppb		
urities – Cobalt (Co)	≤ 1.0 ppb	< 0.3 ppb		
urities – Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb		
urities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb		
urities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb		
urities – Gold (Au)	≤ 4.0 ppb	0.2 ppb		
als (as Pb)	≤ 100 ppb	< 50 ppb		
rrities – Iron (Fe)	≤ 15 ppb	6 ppb		
urities – Gold (Au) als (as Pb)	≤ 4.0 ppb ≤ 100 ppb	0.2 ppb < 50 ppb		

>>> Continued on page 2 >>>





Material No.: 9530-33 Batch No.: 22F0762009

Test	Specification	Result		
Trace Impurities – Lead (Pb)	≤ 1.0 ppb	< 0.5 ppb		
Trace Impurities – Lithium (Li)	≤ 1.0 ppb	< 0.2 ppb		
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	0.8 ppb		
Trace Impurities – Manganese (Mn)	≤ 1.0 ppb	< 0.4 ppb		
Trace Impurities - Mercury (Hg)	≤ 0.5 ppb	0.1 ppb		
Trace Impurities - Molybdenum (Mo)	≤ 10.0 ppb	< 3.0 ppb		
Trace Impurities - Nickel (Ni)	≤ 4.0 ppb	< 0.3 ppb		
Trace Impurities - Niobium (Nb)	≤ 1.0 ppb	< 0.2 ppb		
Trace Impurities – Potassium (K)	≤ 9.0 ppb	< 2.0 ppb		
Trace Impurities – Selenium (Se), For Information Only		< 1.0 ppb		
Trace Impurities – Silicon (Si)	≤ 100.0 ppb	1.0 ppb		
Trace Impurities – Silver (Ag)	≤ 1.0 ppb	< 0.3 ppb		
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	0.7 ppb		
Trace Impurities - Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb		
Trace Impurities – Tantalum (Ta)	≤ 1.0 ppb	< 0.9 ppb		
Trace Impurities – Thallium (TI)	≤ 5.0 ppb	< 2.0 ppb		
Trace Impurities – Tin (Sn)	≤ 5.0 ppb	< 0.8 ppb		
Trace Impurities – Titanium (Ti)	≤ 1.0 ppb	0.2 ppb		
Trace Impurities – Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb		
Trace Impurities – Zinc (Zn)	≤ 5.0 ppb	0.8 ppb		
Frace Impurities – Zirconium (Zr)	≤ 1.0 ppb	< 0.1 ppb		

Hydrochloric Acid, 36.5-38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis





Material No.: 9530-33 Batch No.: 22F0762009

Test Specification Result

For Laboratory, Research, or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications Storage Condition: Store below 25 °C.

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC



Nitric Acid 69% **CMOS** 

Receive: Avantor





Material No.: 9606-03 Batch No.: 24B1362001

Manufactured Date: 2024-01-25 Retest Date: 2029-01-23

Revision No.: 0

### Certificate of Analysis

Test	Specification	Result			
Assay (HNO <sub>3</sub> )	69.0 ~ 70.0 %	69.6 %			
Appearance	Passes Test	Passes Test			
Color (APHA)	≤ 10	5			
Residue after Ignition	≤ 2 ppm	< 1 ppm			
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm			
Phosphate (PO <sub>4</sub> )	≤ 0.10 ppm	< 0.03 ppm			
Sulfate (SO <sub>4</sub> )	≤ 0.2 ppm	< 0.2 ppm			
Trace Impurities - Aluminum (AI)	≤ 40.0 ppb	< 1.0 ppb			
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb			
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb			
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb			
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb			
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	< 0.2 ppb			
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb			
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities - Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities - Germanium (Ge)	≤ 20 ppb	< 10 ppb			
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb			
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb			
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb			
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb			
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb			
Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb			
Trace Impurities - Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb			

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 24B1362001

Test	Specification	Result
Trace Impurities - Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 50 ppb	< 10 ppb
Trace Impurities - Silicon (Si)	≤ 50 ppb	< 10 ppb
Trace Impurities - Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	< 5.0 ppb
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Thallium (TI)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Tin (Sn)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 60 par/ml	3 par/ml
Particle Count – 1.0 µm and greater	≤ 10 par/ml	1 par/ml

Nitric Acid 69% **CMOS** 





Material No.: 9606-03 Batch No.: 24B1362001

Test

Specification

Result

For Microelectronic Use

Country of Origin: USA Packaging Site: Phillipsburg Mfg Ctr & DC

Sr. Manager, Quality Assurance

Nitric Acid 69% **CMOS** 

Receive: Avantor





Material No.: 9606-03 Batch No.: 24B1362001

Manufactured Date: 2024-01-25 Retest Date: 2029-01-23

Revision No.: 0

#### Certificate of Analysis

Test	Specification	Result
Assay (HNO <sub>3</sub> )	69.0 ~ 70.0 %	69.6 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO <sub>4</sub> )	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities - Aluminum (AI)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	< 0.2 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 24B1362001

Test	Specification	Result
Trace Impurities - Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 50 ppb	< 10 ppb
Trace Impurities - Silicon (Si)	≤ 50 ppb	< 10 ppb
Trace Impurities - Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	< 5.0 ppb
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 5.0 ppb
Trace impurities – Thallium (TI)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Tin (Sn)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 60 par/ml	3 par/ml
Particle Count – 1.0 µm and greater	≤ 10 par/ml	1 par/ml

Nitric Acid 69% **CMOS** 





Material No.: 9606-03 Batch No.: 24B1362001

Test

Specification

Result

For Microelectronic Use

Country of Origin: USA Packaging Site: Phillipsburg Mfg Ctr & DC

Sr. Manager, Quality Assurance

M6118





Recieve -> 10/9/24

Metdig

Material No.: 9530-33 Batch No.: 22E1662006

Manufactured Date: 2022-04-11 Retest Date: 2027-04-10

Revision No.: 0

#### Certificate of Analysis

Test	Specification	Result
ACS - Assay (as HCI) (by acid-base titrn)	36.5 - 38.0 %	37.6 %
ACS – Color (APHA)	≤ 10	5
ACS - Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS - Specific Gravity at 60°/60°F	1.185 - 1.192	1.190
ACS – Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS – Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS - Free Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO <sub>4</sub> )	≤ 0.05 ppm	< 0.03 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO <sub>3</sub> )	≤ 0.8 ppm	0.3 ppm
Ammonium (NH <sub>4</sub> )	≤ 3 ppm	< 1 ppm
Trace Impurities - Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities - Aluminum (AI)	≤ 10.0 ppb	< 0.2 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities - Barium (Ba)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities - Beryllium (Be)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities - Bismuth (Bi)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Boron (B)	≤ 20.0 ppb	< 5.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	37.0 ppb
Trace Impurities - Chromium (Cr)	≤ 1.0 ppb	< 0.4 ppb
Trace Impurities - Cobalt (Co)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities - Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities - Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities - Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities – Gold (Au)	≤ 4.0 ppb	0.2 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities - Iron (Fe)	≤ 15 ppb	* *

>>> Continued on page 2 >>>





Material No.: 9530-33 Batch No.: 22E1662006

Test	Specification	Result
Trace Impurities – Lead (Pb)	≤ 1.0 ppb	< 0.5 ppb
Trace Impurities - Lithium (Li)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	1.0 ppb
Trace Impurities - Manganese (Mn)	≤ 1.0 ppb	< 0.4 ppb
Trace Impurities – Mercury (Hg)	≤ 0.5 ppb	0.1 ppb
Trace Impurities - Molybdenum (Mo)	≤ 10.0 ppb	< 3.0 ppb
Trace Impurities - Nickel (Ni)	≤ 4.0 ppb	< 0.3 ppb
Trace Impurities - Niobium (Nb)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Potassium (K)	≤ 9.0 ppb	< 2.0 ppb
Trace Impurities – Selenium (Se), For Information Only		1.0 ppb
Trace Impurities - Silicon (Si)	≤ 100.0 ppb	< 0.4 ppb
Trace Impurities – Silver (Ag)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	1.9 ppb
Trace Impurities – Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Tantalum (Ta)	≤ 1.0 ppb	< 0.9 ppb
Trace Impurities – Thallium (TI)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Tin (Sn)	≤ 5.0 ppb	< 0.8 ppb
Trace Impurities – Titanium (Ti)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Zinc (Zn)	≤ 5.0 ppb	< 0.3 ppb
Frace Impurities - Zirconium (Zr)	≤ 1.0 ppb	< 0.1 ppb

Hydrochloric Acid, 36.5-38.0%

BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis





Material No.: 9530-33 Batch No.: 22E1662006

Test Specification Result

For Laboratory,Research,or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications Storage Condition: Store below 25 °C.

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC







M 6120

R->10/13/24 Met dig

Material No.: 9606-03 Batch No.: 2310662003

Manufactured Date: 2023-08-21 Retest Date: 2028-08-19

Revision No.: 0

#### Certificate of Analysis

Test	Specification	Result
Assay (HNO3)	69.0 - 70.0 %	69.5 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	10
Residue after Ignition	≤ 2 ppm	< 2 ppm
Chloride (CI)	≤ 0.08 ppm	< 0.08 ppm
Phosphate (PO <sub>4</sub> )	≤ 0.10 ppm	< 0.10 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.2 ppm	0.2 ppm
Trace Impurities - Aluminum (AI)	≤ 40.0 ppb	< 40.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 5.0 ppb
Trace Impurities - Barium (Ba)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 20.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 50 ppb	< 50 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	< 50.0 ppb
Trace Impurities – Chromium (Cr)	≤ 30.0 ppb	30.0 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 20 ppb
Trace Impurities – Gold (Au)	≤ 20 ppb	< 20 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 100 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 40.0 ppb
Frace Impurities – Lead (Pb)	≤ 20.0 ppb	< 20.0 ppb
Frace Impurities – Lithium (Li)	≤ 10.0 ppb	< 10.0 ppb
race Impurities – Magnesium (Mg)	≤ 20 ppb	< 20 ppb
race Impurities – Manganese (Mn)	≤ 10.0 ppb	< 10.0 ppb
race Impurities – Nickel (Ni)	≤ 20.0 ppb	< 20.0 ppb

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 2310662003

Test	Specification	Result
Trace Impurities - Niobium (Nb)	≤ 50.0 ppb	< 50.0 ppb
Trace Impurities - Potassium (K)	≤ 50 ppb	< 50 ppb
Trace Impurities - Silicon (Si)	≤ 50 ppb	< 50 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 20.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	< 150.0 ppb
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 30.0 ppb
Trace Impurities - Tantalum (Ta)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Thallium (TI)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Tin (Sn)	≤ 20.0 ppb	< 20.0 ppb
Trace Impurities - Titanium (Ti)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Vanadium (V)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Zinc (Zn)	≤ 20.0 ppb	< 20.0 ppb
Trace Impurities - Zirconium (Zr)	≤ 10.0 ppb	< 10.0 ppb
Particle Count - 0.5 µm and greater	≤ 60 par/ml	60 par/ml
Particle Count - 1.0 µm and greater	≤ 10 par/ml	10 par/ml

Nitric Acid 69% CMOS





Material No.: 9606-03 Batch No.: 2310662003

Test

Specification

Result

For Microelectronic Use

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC

Ken Koehnlein Sr. Manager, Quality Assurance Hydrochloric Acid, 36.5-38.0% BAKER INSTRA-ANALYZED® Reagent

For Trace Metal Analysis





R->10/13/24 Met dig

M 6121

Material No.: 9530-33 Batch No.: 0000275677 Manufactured Date: 2020/12/16 Retest Date: 2025/12/15

Revision No: 1

#### Certificate of Analysis

Test	Specification	Result		
ACS - Assay (as HCl) (by acid-base titrn)	36.5 - 38.0 %	37.6		
ACS - Color (APHA)	<= 10	5		
ACS - Residue after Ignition	<= 3 ppm	1		
ACS - Specific Gravity at 60°/60°F	1.185 – 1.192	1.190		
ACS – Bromide (Br)	<= 0.005 %	< 0.005		
ACS - Extractable Organic Substances	<= 5 ppm	1		
ACS - Free Chlorine (as Cl2)	<= 0.5 ppm	< 0.5		
Phosphate (PO <sub>4</sub> )	<= 0.05 ppm	< 0.03		
Sulfate (SO <sub>4</sub> )	<= 0.5 ppm	< 0.3		
Sulfite (SO <sub>3</sub> )	<= 0.8 ppm	0.3		
Ammonium (NH <sub>4</sub> )	<= 3 ppm	< 1		
Trace Impurities – Arsenic (As)	<= 0.010 ppm	< 0.003		
Trace Impurities - Aluminum (Al)	<= 10.0 ppb	< 0.2		
Arsenic and Antimony (as As)	<= 5 ppb	< 3		
Trace Impurities – Barium (Ba)	<= 1.0 ppb	< 0.2		
Trace Impurities – Beryllium (Be)	<= 1.0 ppb	< 0.2		
Trace Impurities – Bismuth (Bi)	<= 10.0 ppb	< 1.0		
Trace Impurities – Boron (B)	<= 20.0 ppb	< 5.0		
Frace Impurities – Cadmium (Cd)	<= 1.0 ppb	< 0.3		
Frace Impurities – Calcium (Ca)	<= 50.0 ppb	29.7		
race Impurities – Chromium (Cr)	<= 1.0 ppb	< 0.4		
race Impurities – Cobalt (Co)	<= 1.0 ppb	< 0.4		
race Impurities – Copper (Cu)	<= 1.0 ppb	< 0.1		
race Impurities – Gallium (Ga)	<= 1.0 ppb	< 0.2		

Material No.: 9530-33 Batch No.: 0000275677

Test	Specification	Result
Trace Impurities - Germanium (Ge)	<= 3.0 ppb	< 2.0
Trace Impurities - Gold (Au)	<= 4.0 ppb	< 0.2
Heavy Metals (as Pb)	<= 100 ppb	< 50
Trace Impurities – Iron (Fe)	<= 15.0 ppb	<1
Trace Impurities – Lead (Pb)	<= 1.0 ppb	< 0.5
Trace Impurities – Lithium (Li)	<= 1.0 ppb	0.2
Trace Impurities – Magnesium (Mg)	<= 10.0 ppb	0.4
Trace Impurities – Manganese (Mn)	<= 1.0 ppb	< 0.4
Trace Impurities – Mercury (Hg)	<= 0.5 ppb	0.1
Trace Impurities – Molybdenum (Mo)	<= 10.0 ppb	< 5.0
Trace Impurities – Nickel (Ni)	<= 4.0 ppb	< 0.3
Trace Impurities – Niobium (Nb)	<= 1.0 ppb	< 0.2
Frace Impurities – Potassium (K)	<= 9.0 ppb	< 2.0
Frace Impurities - Selenium (Se), For Information Only	ppb	1.0
Trace Impurities - Silicon (Si)	<= 100.0 ppb	< 10.0
race Impurities – Silver (Ag)	<= 1.0 ppb	< 0.3
race Impurities – Sodium (Na)	<= 100.0 ppb	< 5.0
race Impurities – Strontium (Sr)	<= 1.0 ppb	< 0.2
race Impurities – Tantalum (Ta)	<= 1.0 ppb	< 0.9
race Impurities – Thallium (TI)	<= 5.0 ppb	< 2.0
race Impurities – Tin (Sn)	<= 5.0 ppb	< 0.8
race Impurities - Titanium (Ti)	<= 1.0 ppb	0.8
race Impurities – Vanadium (V)	<= 1.0 ppb	< 0.2
race Impurities – Zinc (Zn)	<= 5.0 ppb	
race Impurities – Zirconium (Zr)	<= 1.0 ppb	0.3 < 0.1

For Laboratory, Research or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications

Country of Origin:

US

Packaging Site:

Phillipsburg Mfg Ctr & DC



#### 800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



## Certified Reference Material CRM

https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

CERTIFIED WEIGHT REPORT:

Part Number:

58111 122223

Sodium (Na)

Lot Number: Description:

Nominal Concentration (µg/mL):

**NIST Test Number:** 

**6UTB** 10000

Weight shown below was diluted to (mL):

3000.4

0.06 Flask Uncertainty 5E-05 Balance Uncertainty

RW#

Number Lot

Nominal

Purity

Uncertainty Assay Purity (%)

Target

Actual

8

38

Recommended Storage:

Ambient (20 °C)

122226

**Expiration Date:** 

Lot # M5807

Solvent:

24002546 Nitric Acid

2%

60.0 (III)

Nitric Acid

Formulated By: 13827 P Aleah O'Brady Back

Reviewed By: Pedro L. Rentas

122223

22223

Actual Uncertainty Expanded (Solvent Safety Info. On Attached pg.) **SDS Information** TSIN

CAS#

SE

1. Sodium nitrate (Na) IN036 NAV01201511 Conc. (µg/mL) 10000 98.999 0.10 26.9 111.5406 Weight (g) Weight (g) Conc. (µg/mL) 111.5479 10000.7 +/- (µg/mL) 20.0 7631-99-4 OSHA PEL (TWA) 5 mg/m3 ori-rat 3430 mg/kg 3152a

1 m/z-> 17/z-Y m/z-> N.5E6 5.0E6 2.5E6 5.0E6 2.5E5 5.0E5 [1] Spectrum No.1 210 110 0 220 120 NO. [ 8.935 sec]:58111.D# [Count] [Linear] 130 230 30 140 240 6 150 250 50 160 260 0 170 70 180 80 190 90 100 200

Part # 58111



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

	As Ba Ba Ba	
	40.2 40.2 40.2 40.0 40.0 40.0 40.0 40.0	
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	Mo Mg Lu	fetals
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	S R R R R	NO C
	444	(m/)
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	in Signal in the	ı
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	**************************************	
	600000000000000000000000000000000000000	

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). \* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.
\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

www.absolutestandards.com



## Certified Reference Material CRM

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: 57051 120523 BTU9 1000 120526 Ambient (20 °C) Antimony (Sb) 3000.41 0.058 5E-05 Flask Uncertainty Balance Uncertainty 24002546 Lot # 2.0% M.5802 Nitric Acid Solvent: 0.00 MSBOS Nitric Acid Formulated By: Reviewed By: Pedro L. Rentas Lawrence Barry 120523 120523

1. Antimony (Sb)

58151

100923

0.1000

300.0

1000

10001.4

1000.0

7440-36-0

0.5 mg/m3

orl-rat 7000 mg/kg 3102a

Number Part

Number Ď

Vol. (ml.)

Pipette (ml.) Conc. (µg/ml.)

Conc. (µg/mL)

Conc. (µg/ml.)

+/- (µg/mt.) Uncertainty Expanded

CAS#

(Solvent Safety Info. On Attached pg.) OSHA PEL (TWA)

LD50

SRM NIST SDS Information

Final

Dilution Factor

Initial

Uncertainty

Nominal

Compound

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Part # 57051



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(1) = Target analyte

### Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. \* Purified acids, 18.2 megohm delonized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

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Printed: 1/16/2024, 3:48:48 PM

Part # 57051

Lot # 120523

Certified Reference Material CRM

M6030



AR-1539 Certificate Number https://Absolutestandards.com ANAB ISO 17034 Accredited

R = 8 | 5 | 24

www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

800-368-1131

Absolute Standards, Inc.

Part Number: Solvent: 24002546 Lot # Nitric Acid

Lot Number: Description: 57047 122823 Silver (Ag)

Recommended Storage: **Expiration Date:** 1000 122826

Weight shown below was diluted to (mL): 4000.30

Silver nitrate (Ag)

IN035 J0612AGA1

1000.0

0.10

63.7

6.27992

6.27998

1000.0

2.0

7761-88-B

10 ug/m3

Z

3151

Nominal Concentration (µg/mL): NIST Test Number: **6UTB** Ambient (20 °C) 0.058 Flask Uncertainty 5E-05 Balance Uncertainty

2% <u>E</u> 80.0 Nitric Acid

Formulated By:

Benson Chan

122823

122823

Reviewed By: Pedro L. Rentas

Compound RM# Number 헏 Conc. (µg/mL) Nominal Purity Uncertainty Assay 8 Purity (%) 38 Weight (g) Target Weight (g) Conc. (µg/mL) Actual Actual +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) SDS Information NIST SRM

m/z-> m/z-> W-2/m 5.0E6 5.0E5 1.0≡6 2.5E6 5.0E6 1.0€7 [1] Spectrum No.1 210 110 0 120 NNO NO [ 14.044 sec]:58147.D# [Count] [Linear] 230 130 30 140 240 ò 150 250 50 260 160 00 170 0 180 0 190 000 200 100

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							race Me	letals	Verificat	tion	by ICP-I	S	ug/mL)						
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Physical Characterization:

(T)= Target analyte

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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## Absolute Standards, Inc. 800-368-1131

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## Certified Reference Material CRM

M6023

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

		Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	CERTIFIED WEIGHT REPORT:
Lot		ted to (mL):	8TUB	1000	Ambient (20 °C)	062727		Thalllum (TI)	062724	57081	
Nominal		2000.1			၀ (၄)						
Purity Uncertainty Assay		0.10 Flask Uncertainty	5E-05 Balance Uncertainty				2%			Solvent:	
Target						(mL)	40.0			Solvent: 24002546	Lot #
Actual							Nitric Acid			Nitric Acid	
Actual											
Uncertainty	Expanded		Reviewed By:	Juna	1		Formulated By:	4	TO ST	>	
(Solvent Safety Info. On Attached pg.)	SDS Information		Pedro L. Rentas	" human	A A		Aleah O'Brady	0	San O To asign	7	
ched pg.) NIST			062724				062724			,	
7											

RW#

Number

Conc. (µg/mL) (%)

Purity (%) (%)

Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM

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Part # 57081



https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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### Physical Characterization:

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# Certified Reference Material CRM

M6021

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT Part Number: Lot Number: 57023 062424 24002546 Nitric Acid Solvent:

Nitric Acid

Ambient (20 °C) 2.0% (III) 40.0

Formulated By:

Aleah O'Brady

062424

ASSET O DE LONG

Recommended Storage:

**Expiration Date:** 

062427

Description:

Vanadium (V)

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): NIST Test Number: **6UTB** 1000 2000.3 5E-05 0.06 Balance Uncertainty Flask Uncertainty Reviewed By:

Pedro L. Rentas

062424

Ammonium metavanadate (V) Compound 58123 Number Part 021224 Number D D 0.1000 Dilution Factor Vol. (mL) Pipette (mL) Conc. (µg/mL) 200.0 Initial Uncertainty 0.084 Nominal 1000 Conc. (µg/mL) Conc. (µg/mL) 10000.3 nitial 1000.0 Final +/- (µg/mL) Uncertainty Expanded 22 7803-55-6 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) 0.05 mg/m3 **SDS Information** orl-rat 58.1mg/kg LD50 3165 NIST SRM

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Part # 57023

# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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